Industry Readies For a Cold Front

Cryogenic temperatures, generally below −300° F, perform magic on most metals—transforming them in often unexpected ways. For example, currents flowing in the supercooled circuits shown above may continue indefinitely without any added push. And superconductivity is only one of the properties metalworking is beginning to extract from the cryogenic field. For more examples, see Page 70.

STEEL

The

Metalworking Weekly

OCTOBER 3, 1960

A PENTON PUBLICATION

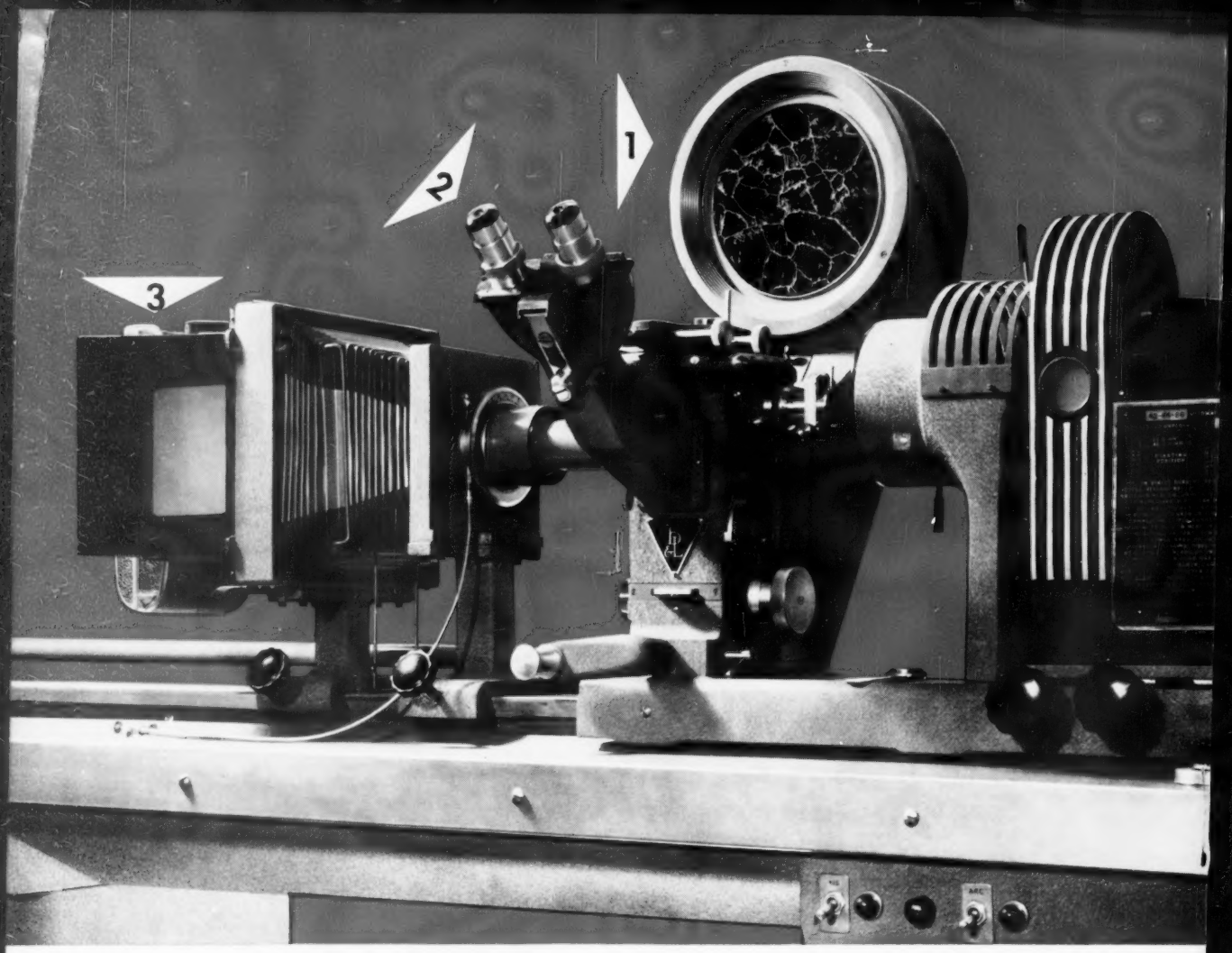
Panel of Economic Consultants Sees End of Business Dip in Mid-1961

15 New Ways to Use Photography

New Formula, Bath Control Widen Potential for Bright Dipping

Part Buying Begins to Stabilize

CONTENTS—TURN PAGE



GEAR STEEL has no secrets here

This instrument provides three ways to examine the micro structure of steel.

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2. *Examine it through a microscope.*
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Thus, chemical constituents can be analyzed, hardness patterns detected, and precise control of heat treatment can be determined.

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This Week in STEEL

The Metalworking Weekly

October 3, 1960 Vol. 147 No. 14

Housing to Lead Upturn in 1961, Say Economists

Spurred by the government's easing of the money situation, private, nonfarm housing starts next year will climb 6.4 per cent over the 1960 level and lead the economy out of a fairly short and shallow recession, predicts STEEL's Panel of Economic Consultants. The economists think that the fourth post-World War II readjustment will last about nine months and will go no deeper than 15 per cent below the peak of January, 1960. It will be a durable goods recession, with steel, auto, and capital goods production showing some declines. PAGE 39

Stainless Sales to Rise 87 Per Cent by 1967 (vs. 1957)

To help service centers, International Nickel Co. has released a market study showing that sales of stainless steel will go up to 1,112,000 tons annually by 1967. That's a gain of 87 per cent over 1957's sales, four times the tonnage sold in 1947. The study also forecasts carbon and alloy steel sales. PAGE 43

15 Ways Photography Pays Off

Intelligent use of photography can help you to trim costs, save time, boost quality, close sales, speed research (illustrated here), and bolster employee relations. Many metalworking firms are already using photography in its many forms to advantage. Examples cited include use of black and white, color, high speed, and time lapse movies; black and white and color stills. For instance, one firm took high speed photos to discover why a press jammed at 135 strokes a minute. In most cases, you don't need to hire a professional. PAGE 50

New Formula, Bath Control Spur Bright Dipping

Look for growth of bright dipping as the result of two developments: 1. A new formula to replace phosphoric acid. It eliminates the nitric oxide problem when aluminum is bright dipped. 2. An electrical monitoring device that greatly simplifies bath control. Other benefits: A 10 to 30 per cent drop in material costs and a 75 per cent reduction in rejected material. PAGE 82

Part Buying Begins to Stabilize

Component buyers have succeeded in working down much of the excess in their inventories. The number of respondents to STEEL's quarterly survey who are planning to build reserves approaches those planning continued reductions. So the fourth quarter is shaping up as one of reasonable stability with few dramatic changes in the inventory situation. PAGE 98

COMPLETE CONTENTS ▶

CONTENTS

Metalworking Week, Page 29

The Editor's Views—Beware the Bugbears 35
Economic Consultants See End of Business Dip by Mid-1961 39
Containerization Is Catching On—It facilitates shipping 42
Stainless Sales to Rise 87 Per Cent by 1967 (vs. 1957) 43
Steel Mill Equipment Outlook: Up—Pickup expected in 1961 44
McDowell Process Bypasses Blast Furnace in Making Iron 45
Knapp Mills Inc. Develops "Insmetals"—They're bonded materials 45
Aussie Steel Nears Self-Sufficiency—Net exporter by mid-'60s? 49
15 Ways Photography Pays Off—Tips from metalworking firms .. 50
Metalworkers Seek Bigger Slice of World Markets 66

Technical Outlook, Page 69

Cryogenics: Open Sesame to New Properties—Examples cited 70
Integral Chromate Coating Protects Galvanized Strip 74
Motorized Lifting Device Simplifies Sheet Stacking 75
Foundry Switches Over to Zircon Sand Shell Molds 76
Progress in Steelmaking—Mobile Shed Reduces Cost of Coke Oven Rebuilding—Permits piecemeal overhaul of multioven batteries .. 78
Slots Extend Range of Airplanes—May double fuel mileage 80
Lead Screens Sharpen "Seeing" Power of X-Rays 81
Bright Dip Features Fume Control—Tested by aluminum extruder .. 82

Market Outlook, Page 97

Complete Index to Market News and Prices 97
Part Buying Begins to Stabilize—Quarterly STEEL survey 98
Chicago's Steel Imports Cut 69 Per Cent in 1960 99
Steelworks Operation Chart and District Ingot Rates 102
Structural Steel Tonnage Shipments Gain in August 102
Scrap Prices Still Point Down—Composite drops 67 cents 114
Canadian Steel Could Be Headed for Record Year 115
Nonferrous Metals—Defense Boosts Titanium Output 118

WHERE TO FIND

Servicenter 5
Calendar of Meetings 10
Editorial & Business Staffs 16
Metalworking Pulse 32
Windows of Washington .. 46
Mirrors of Motordom 55
The Business Trend 59
Men of Industry 63
Obituaries 65
New Products 85
New Literature 95
Advertising Index 123

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BETHLEHEM INSPECTORS measure the magnetic gap between the pole pieces of a magnet for the new University of Colorado cyclotron.

85-ton magnet for new research cyclotron forged, machined, and assembled by Bethlehem

The core of a new research cyclotron to be installed by the University of Colorado at Boulder is that 85-ton magnet you see above.

To make this magnet accurate and controllable, Bethlehem had to finish the huge magnet parts to thousandths and to micro-inch finishes. Most critical were the pole tips, which had to be machined to parallelism within 0.004 in. on the 52-in. diameter. They were machined a few thousandths oversize, then the final fitting and machining was done.

The forged pole pieces are tapered on the sides from 59 to 52 in. on the diameter, and are 14.4 in. thick.

The yoke members, four of them, were forged in a 7500-ton hydraulic press, then machined to 250-micro-in. with mating surfaces finished to 125 micro-in. They weigh 73 tons, and are held together by large dowel pins and studs. They form a rectangular yoke assembly 142½ in. long, 60 in. wide, and 88½ in. high. The opening measures 96 by 42 in.

When completed, the Boulder cyclotron, a strong-focusing type, will have a capacity range of 10 to 30 million electron volts. The electrons will strike a target when their final speed is built up to ⅕ the speed of light.

Bethlehem Steel Company, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

"Not one failure in 10 years with USS American springs"

Mr. Lee Dunn, Sales Manager of Walter Balfour & Co., Inc., tells why American Steel & Wire Springs are used in Balfour Doc-Port Rolling Steel Pier doors.

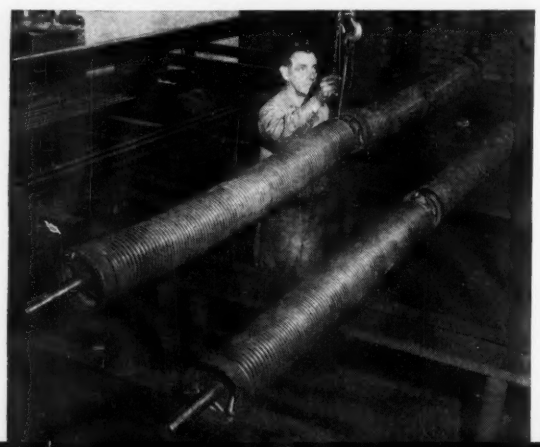
"The springs in our doors have to be exceptionally tough and dependable," says Mr. Dunn. "The performance of the doors is dependent upon the quality of the springs. The springs must act uniformly over their entire length because the doors must be perfectly counter-balanced at every point of travel. Springs of the same wire diameter and coil diameter *must* have identical characteristics. In the ten years we've been using American Steel & Wire springs, we've never experienced a failure.

"Most of the USS American springs used by the Balfour Company are made from 7/16" cold wound wire. In the larger steel pier doors there are actually multiples of our helical torsion spring sizes . . . 5/8", 7/16", 1/2", and 13/32". Springs are nested one within another, each spring mounted on shaped cast anchors which are fixed to a single torsion rod, so that the springs are equally and simultaneously loaded."

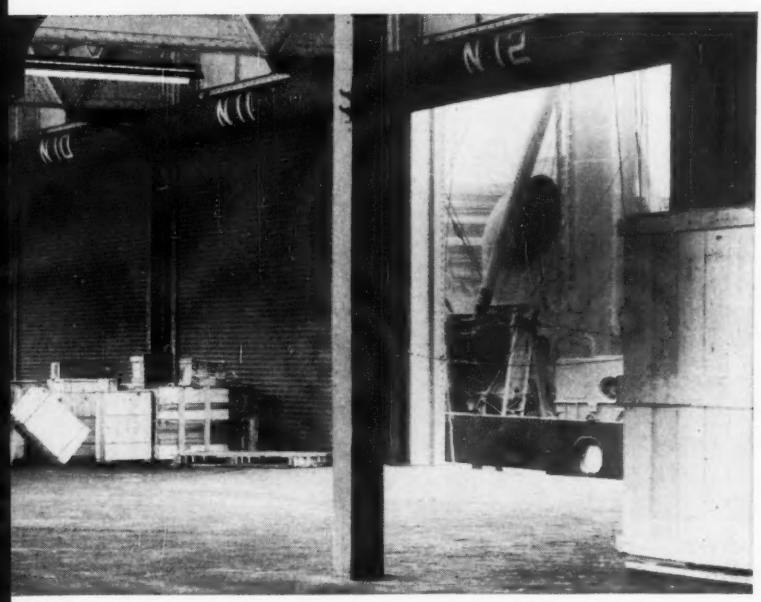
When springs are your special problem, come to American Steel & Wire. Our Spring Engineering Service has a solid reputation for coming up with the right answer at the right time. They'll be glad to pitch in on your problem. Give us a call today, or write American Steel & Wire, Dept. 0406, 614 Superior Avenue, N.W., Cleveland 13, Ohio.

USS and American are registered trademarks

Cold wound springs in Balfour doors are placed inside steel cylinders and fixed on each end to anchors that prevent internal collapsing of the springs at contact points.



Balfour doors are exposed to heavy wind loads and salt water spray, but they can take it—and so can the USS American springs.



3000 lbs. ride on each USS American spring assembly every time these big 18′ x 24′ Balfour Pier doors open and close. It takes rugged, long-lasting springs to stand up under this kind of punishment.

American Steel & Wire
Division of
United States Steel

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Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad

This mark tells you a product is made of modern, dependable Steel.

steel bars, tubes, angles, etc. . . . cast iron, bronze, brass

cut them fast and cut your costs with SIMONDS CUT-OFF WHEELS

For cutting metals *and* costs, use these abrasive wheels. They are just about the quickest, most efficient way to cut all kinds of metal and non-metals, and, since Simonds makes them in all grain, grade and bond combinations, you are sure of getting the ones exactly suited to *your* needs.

Regular Resinoid bonded for the rigors of high speed operation. Borolon (aluminum oxide abrasive) for steel bars, tubes, angles, etc. Electrolon (silicon carbide) for cast iron, bronze, brass and non-metals.

Reinforced Resinoid bonded for added strength. Hot pressed "BFN" type for foundry work . . . Double XX type, glass fiber reinforced on both sides, for cutting all metals and non-metals (except wood), including masonry blades.

Regular Rubber bonded for wet or dry grinding. Ideal for cutting all materials under stress and strain. Because of their clean-cutting action, finishing operations can be eliminated.

Reinforced Rubber bonded for extra safety. For swing-frame cutting on gates, risers, etc. Available wtih (1) Standard Reinforcement; fiber glass on both sides (2) Double Reinforcement; reinforced internally in addition to both sides, or (3) Triple Reinforcement; two internal reinforcements in addition to both sides.

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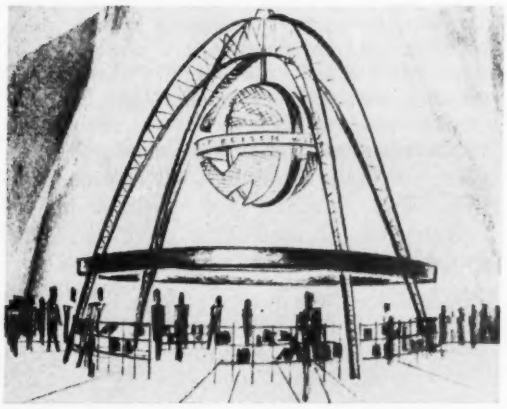


Visitors to the Metal Show . . .

. . . in Philadelphia, Oct. 17-21, will be greeted by the sight of this 34 ft steel "quadrilon." It keys one of the show's themes: "Build it better with America's steel—Basic material of construction."

If you're going to the show, be sure to check next week's STEEL. You'll find show programs and our 1960 Metal Selector, the most up to date digest of metals that's available.

Ed Case, our metallurgical editor, is busy completing the Selector but paused to note that the work's 32 pages will list more than 1000 metals. Some 200 changes were made on the first four pages alone. Causing the alterations: More alloys and more alloy producers.

To give you a rough idea of the contents, the Selector will carry its listings in this size type.

Straw Polls . . .

. . . abound this year, and we're adding one we think will interest you. The Penton Publishing Co.'s Exhibit Manager, Rand Ebersole, has arranged for STEEL to use two automatic voting machines during the show.

Visitors to our booth (No. 1830) will have a chance to cast a pre-election ballot for the nation's Presidential and Vice Presidential candidates.

Also on STEEL's ballot will be eight "yes" or "no" questions concerning the national economy and the metalworking industry. No clues now. Just stop in at our booth. Results will be published sometime before the national election on Nov. 8. (*Remember to vote then too.*)

We Hear About an Issue

Phone calls, telegrams, and letters have been building the workload in our Reprint Department.

Within two weeks after the Sept. 5 issue was published, the department had mailed 35,299 copies of the four page Metalworking Week section, "Our Fight for Survival in New World Market." Here are some excerpts from letters:

'Send 200 copies . . .

. . . of the four page insert," requests Nelson L. Ellis, sales promotion manager, Eastern Stainless Steel Corp., Baltimore. ". . . This story is so apropos of today's situation, that we wish to call it to the attention of our supervisory staff. . ."

'Congratulations . . .'

. . . said J. Robert Groff, president and general manager, James Leffel & Co., Springfield, Ohio. "The hydraulic turbine industry was among the first that was badly hit by foreign competition, and we have been fighting it for years. We just finished a 'battle' at Flaming Gorge . . . the Reclamation Bureau (has) gone off the 6 per cent and onto another tune that apparently pleased their rationalized proclivities . . . All four jobs awarded—two to Americans and two to foreigners—just about make up a good segment of a year's business in our industry . . .

"We would like to get reprints of five articles into the hands of a lot of our Representatives and Senators who have been well barraged by us in the Flaming Gorge case, and we would like to spread it to a lot of other points that need being informed."

'We Have Received . . .

. . . two or three letters from the heads of other companies requesting additional information about our program of employee communications at Elizabethport. Would you send me three copies of the issue?" asked B. F. Thompson, director of public relations, Singer Mfg. Co., New York.

(In the issue, the editors cited Singer's continuing, well planned, employee communication program.)

'Compliments Are in Order . . .

. . . to you for having produced an excellent document on the challenges of the world market; and the even greater challenge to American industry to keep its domestic market," wrote R. C.

"the HITCHINER way..."

...and non-machinable super alloys in INVESTMENT CASTING

These spray nozzles for highway striping paint sprayers were formerly machined out of cold rolled bar stock. When ordinary paint was used, these nozzles functioned satisfactorily. However, when ground glass was added to the paint for reflecting purposes excessive wear caused frequent replacement.

By "the HITCHINER way . . .", we were able to engineer the manufacture of this part by investment casting in a non-machinable type alloy exhibiting a very high degree of resistance to both wear and corrosion.

This change of alloy, which eliminated the need for frequent nozzle replacement, was made possible through investment casting because the required close dimensional tolerances and detail could be cast to size.

Through the wide freedom of choice in alloy, as well as through flexibility in design and the elimination of expensive machining operations, investment casting may possibly solve your metal parts manufacturing problems. Send us your sample or blueprint and find out with a Hitchiner "engineered quotation" — no obligation.

NO LIMITATIONS. From miniature ball bearing races to 20" Steam Turbine Impellers, "the Hitchiner way . . ." with investment castings can help you.

Send for our latest revised brochure and find out for yourself. It's free.

HITCHINER

MILFORD 29, NEW HAMPSHIRE

Coast to Coast Engineering Representatives

Sollenberger, executive vice president, Conveyor Equipment Manufacturers Association, Washington.

". . . Tariffs, like aspirin, relieve the pain, but do nothing to remove the cause . . . The best approach . . . would be to buy some time by use of restraint in asking for wage raises, raising prices, raising tax rates, and in spending tax money foolishly. We could balance our 'restraint' with positive action to reduce costs of manufacturing and distribution; find the markets; suit products to markets; ad infinitum. The answer lies in no one palliative or cure, but in a combination of a lot of things."

'We Would Like Permission . . .

. . . to reproduce your Metalworking Week column in our employee magazine, *United Effort*," wrote Daniel L. Davis, assistant personnel manager, United Engineering & Foundry Co., Pittsburgh. "We distribute around 9000 copies every three months to employees, shareholders, and friends of the company. . ."

Note on Availability

If you would like to obtain 48-page reprints of the editorial section of the Sept. 5 issue, write to Miss June Schilens, Reprint Department, STEEL, 1213 W. Third St., Cleveland 13, Ohio. Single copies are $2. Prices for greater quantities are available on request.

You Can Win $1000 This Month

There are five issues of STEEL this month — and one could help you win $1000 in our Usership Idea of the Month Contest.

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—October, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . You will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You may enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Dec. 1.**

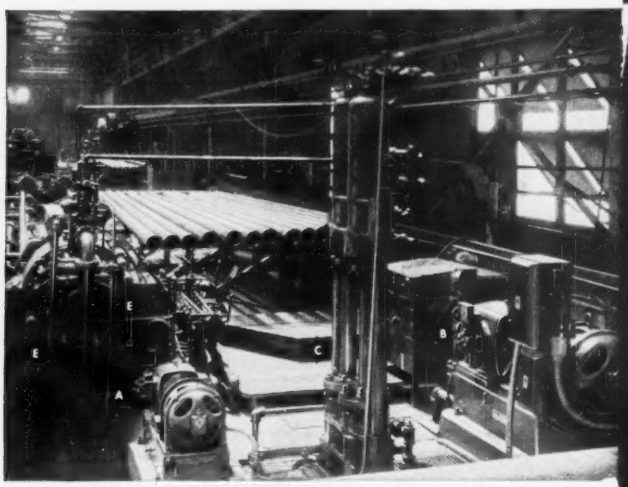
... Fluid Power news

REPORT NO. 11,803 TEST MORE PIPE—LONGER WITH OILGEAR

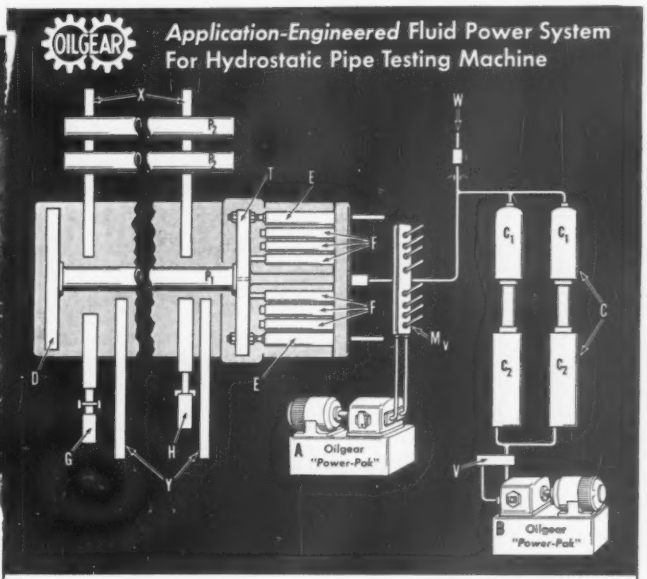
From Oilgear *Application-Engineering* Files

HOW OILGEAR SYSTEM POWERS PIPE TESTER EFFICIENTLY AFTER 23 TROUBLE-FREE YEARS

DATA: To supply power and control system for five functions of a hydrostatic pipe testing machine designed for a wide variety of pipe sizes and testing pressures ranging up to 6000 psi. Linear drives and controls were needed to: *1.* Actuate jaw-type clamps to hold and prevent pipe from buckling. *2.* Traverse testing head rapidly to and from testing position. *3.* Hold testing head against pipe under testing pressures. *4.* Actuate "knockout" arms to eject tested pipe from machine. *5.* Actuate an intensifier to boost water used for testing from city pressure to any selected testing pressure up to 6000 psi. *Specific Operating Requirements:* Simple, safe, dependable; capable of continuous, 'round-the-clock operation, 6 days per week in highly humid atmosphere; cycle rapidly for economical production; require a minimum of maintenance to prevent costly, line-stopping downtime; must be compact to conserve valuable floor space, economical in the use of electrical power.



Hydrostatic Pipe Tester with *Oilgear Application-Engineered Fluid Power System* as installed . 1937, and operating continuously since that time. Oilgear "Power-Paks" (A,B), Intensifier (C), Rapid Traverse Testing Head Cylinders (E) are indicated by arrows. Manifold and Control Valves at operator's station (M_V in drawing) are clearly visible, as are the direct-reading, operating pressure gages on the "Power-Paks." Testing pressures are quickly preset with a small handwheel on "Power-Pak" (B)—not visible. Pipe to be tested rolls directly from pre-testing storage racks, at right, directly into the machine.



HOW IT WORKS: Pipe to be tested (P_2) rolls from storage rack (X) into cradle of machine between Testing Head (T) and Tail Carriage (D). Testing Head (T) is moved forward quickly by Double-Acting Cylinders (E). Clamping Jaws actuated by Cylinder (G) grip the pipe along its length to prevent buckling. Pipe (P_2) is pre-filled with water at city pressure (W). Single-Acting Test Head Holding Cylinders (F) move up in matching pairs—2, 4, 6, 8, 10, or all 12 can be selected—depending on pipe size and testing pressure to hold Testing Head (T) against Pipe (P_1) and Tail Carriage (D). Movement of cylinders (E, F, G, H) are all controlled by valves mounted on Manifold (M_V) which direct fluid flow from Oilgear "Power-Pak" (A). Water at preselected test pressure from Intensifier (C) then exerts pressure on Pipe (P_2). Oilgear "Power-Pak" (B) supplies *Fluid Power* through Valve (V) to actuate Hydraulic Intensifier Cylinders (C_2) increasing pressure in Water Cylinders (C_1) to any desired pressure up to 6000 psi. After pipe is inspected, intensifier pressure is released, Testing Head (T) is rapidly retracted, and Knockout Cylinder (H) actuates mechanism to eject tested pipe onto rack (Y). Machine is then ready to start a new test cycle.

SOLUTION: An *Oilgear Application-Engineered System* consisting of two Oilgear Heavy-Duty "*Power-Paks*," Directional Control Valves, and "Custom-Quality" Cylinders. Each "*Power-Pak*" uses an Oilgear Heavy-Duty One-Way Variable Displacement Radial Rolling Piston Pump with automatic pressure unloading control to reduce pump stroke when holding a preset pressure indefinitely; eliminate excessive heating and power loss; reduce electrical power input requirements. Oilgear Pumps contain integral auxiliary systems for pilot, supercharge, cooling and filtering . . . with constant pressure and flood self-lubrication, conservatively loaded anti-friction bearings, and large internal passages—mechanical and hydraulic friction is reduced to a minimum for high efficiency . . . virtually guaranteeing a long, trouble-free, maintenance-free life.

USER REPORTED IN 1938—"*. . . after one year of operation we have nothing but the highest praise for the Oilgear Equipment on this pipe tester.*"

USER REPORTS IN 1960—"*This machine has given us years of trouble-free service, operating around the clock six days a week . . . maintenance has been at a minimum, with occasional changes in intensifier packings, as would be expected in normal operation . . . performance has been completely satisfactory.*"

With Oilgear Heavy-Duty System Components designed for thousands of hours of continuous service at full rated load, savings are compounded with every hour of uninterrupted performance. That's why machinery and equipment manufacturers and *their* customers say . . .
"*For the lowest cost per year . . . it's Oilgear!*"

For solutions *to YOUR linear or rotary Controlled Motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .*

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REPUBLIC
COLD EXTRUSION QUALITY
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. . . steel that cuts your cost of production

Republic Steel—largest producer of the nation's widest range of bar products—has a new, 11″ bar mill in Chicago that specializes in steel for cold extrusion and cold heading. Features that save you money:

1 **UNIFORM FLOW CHARACTERISTICS**—carbon and alloy steels produced on this mill have denser, more uniform structures because they undergo more hot work. Bigger than usual billets, 3″ and 4″ square, become finished products of standard size.

2 **PRECISE DIMENSIONAL ACCURACY**—16 alternating vertical and horizontal stands with roll neck bearings are utilized to exert uniform pressure on all sides of the bar. This process, along with vertical looping above the mill, eliminates deformations.

3 **ANNEALED, NORMALIZED, SPHEROIDIZED**—new continuous annealing furnaces, capable of all types of furnace treatments, are designed for rigid control of speeds, temperatures, and atmospheres. Other facilities are available to pickle, oil, lime, phosphate, and borax coat bar products.

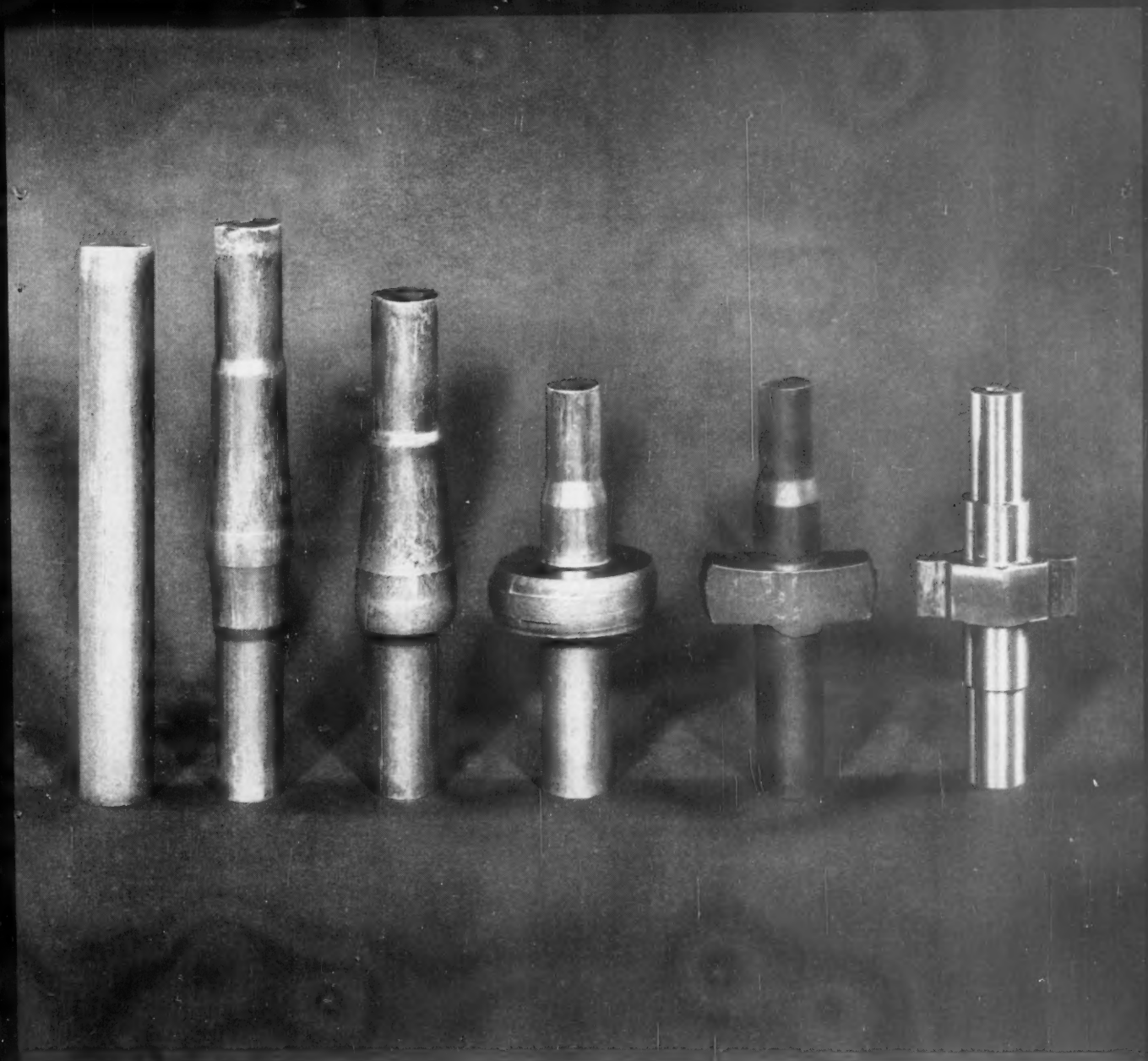
4 **1600-POUND, DOUBLE-BANDED COILS**—four high-speed coilers handle the complete range of coils produced (⅜″ to $^{39}/_{64}$″—700 to 900 pounds, ⅝″ to 1½″—1400 to 1600 pounds). Bigger coils cut downtime and scrap loss. Double banding simplifies your handling.

5 **CAPACITY TO MEET YOUR REQUIREMENTS**—this 11″ bar mill produces bar products at rates of up to 3000 feet per minute. Annealing furnaces are the continuous type, capable of meeting the growing demand for furnace-processed steel.

COLD FINISHED, TOO!

Depending upon the nature of your product and the method by which it is made, you may find it more advantageous to use cold extrusion quality steel in *cold finished form,* as did the manufacturer of this gear.

We would welcome an opportunity to serve you on your requirements for both hot rolled and cold finished, cold extrusion quality steel. Our metallurgists will help you select the most economical carbon, alloy, or stainless steel capable of meeting your requirements. For complete data, call your nearest Republic sales office or mail the coupon.



CUTTING THE COST OF A SEGMENT GEAR: ideal blanks are produced by cold heading, cold extrusion, and upsetting. Stock with upset in the center is hot trimmed on a press, after which it is machined into the finished part. Only a minimum of stock need be removed during final machining. Photo courtesy of National Machinery Company, Tiffin, Ohio.

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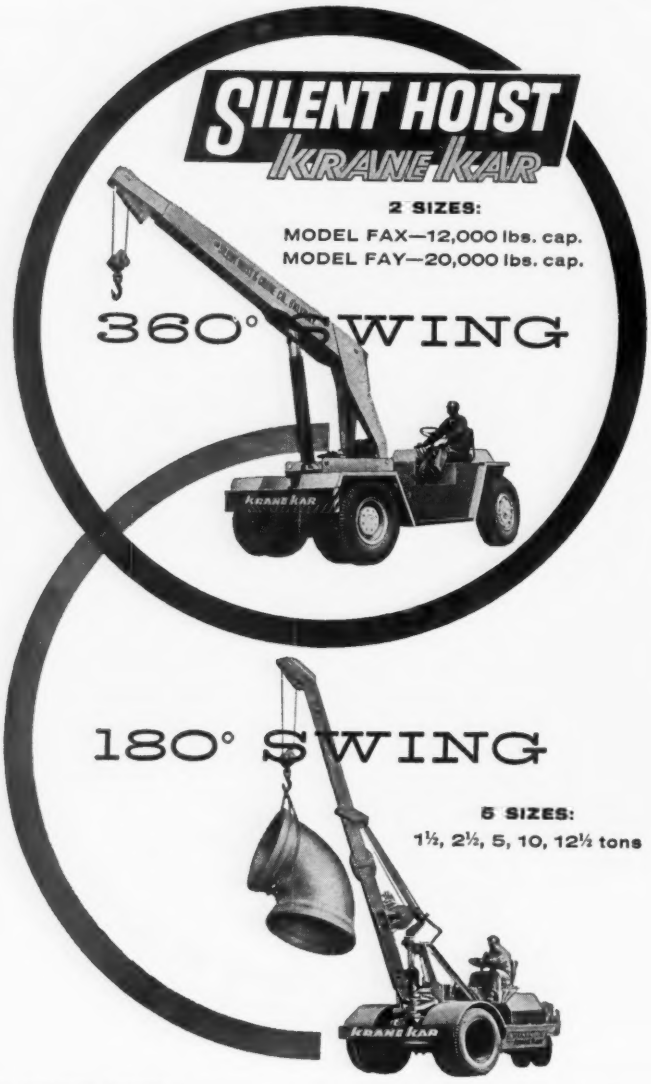
sets the pace again...



360° BOOM SWING—*Now . . . another addition to the famous family of Silent Hoist* **KRANE KAR** . . *the original Mobile Swing Boom Crane!* **BOOM ROTATION:** *All-Hydraulic 360° continual rotation on heavy-duty double-race ball-bearing turntable.* **BOOM:** *15/22 ft., manual or hydraulic telescoping.* **TRANSMISSION:** *Hydraulic power shift directional in combination with flywheel torque converter* **STEERING:** *Full time power steering, finger-tip control.* **ENGINE:** *Heavy duty 6 cylinder valve-in head type.* **BOOM TOPPING:** *Horizontal to highest vertical in only 8 seconds.* **BOOM HOISTING:** *Load block 3 parts of line 25 to 55 fpm.* **TIRES:** *Dual pneumatic tires on traction axle for high flotation and extra blow-out protection.* **TOTAL VISION AND SAFETY:** *No obstruction in any position of load or crane; operator fully protected through 360° rotation of boom. Write for complete details in illustrated bulletin #99.*

180° BOOM SWING—*The Standard widely favored All-Hydraulic or Mechanical 180° swing boom crane models. Lifts, carries, and places any load up to 12½ tons. One engine powers the machine for travel and all crane applications—finger-tip control. Front traction wheel drive supports chassis and crane load. 2 geared speeds for hoisting, topping, and swinging. No tail swing—Boom never passes over Operator's head. Write for complete details in illustrated bulletin #79.*

SILENT HOIST & CRANE CO.
BROOKLYN 20, N. Y.

CALENDAR
OF MEETINGS

Oct. 9-13, Electrochemical Society Inc.: Fall meeting, Shamrock Hotel, Houston. Society's address: 1860 Broadway, New York 23, N. Y. Executive secretary: Robert K. Shannon.

Oct. 9-14, American Institute of Electrical Engineers: Fall general meeting, Morrison Hotel, Chicago. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 10-12, National Electronics Conference Inc.: Annual meeting, Sherman Hotel, Chicago. Conference's address: 228 North LaSalle St., Room 2104, Chicago, Ill. Executive secretary: R. J. Napolitan.

Oct. 10-13, American Mining Congress: Metal mining congress, Las Vegas, Nev. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

Oct. 10-14, Pressed Metal Institute: Annual meeting, Shawnee Inn, Shawnee on Delaware, Pa. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

Oct. 10-14, Society of Automotive Engineers Inc.: National aeronautic meeting, manufacturing forum, and engineering display, Ambassador Hotel, Los Angeles. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Oct. 12-14, Gray Iron Founders' Society Inc.: Annual meeting, Netherland-Hilton Hotel, Cincinnati. Society's address: 930 National City—E. 6th Bldg., Cleveland 14, Ohio. Executive vice president: Donald H. Workman.

Oct. 13-15, Nonferrous Founders' Society: Annual meeting, Grove Park Inn, Asheville, N. C. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive secretary: Herbert Scobie.

Oct. 16-18, National Metal Trades Association: Western Plant Management Conference. French Lick-Sheraton Hotel, French Lick, Ind. Association's address: 337 W. Madison St., Chicago 6, Ill. Secretary: Charles L. Blatchford.

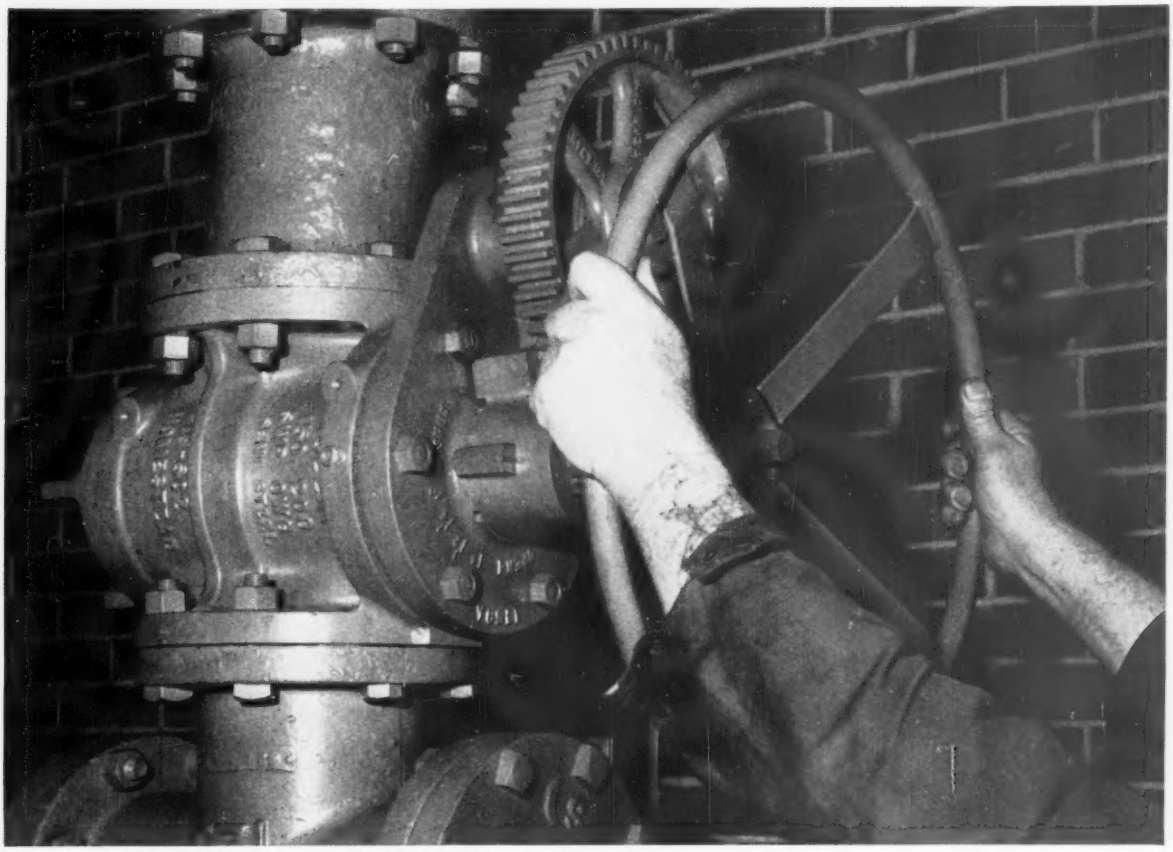
Oct. 16-19, National Association of Sheet Metal Distributors: Annual convention and exhibit, Dennis Hotel and Convention Hall, Atlantic City, N. J. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Oct. 16-21, American Trucking Associations Inc.: Annual meeting, Waldorf-Astoria Hotel, New York. Association's address: 1424 16th St. N.W., Washington 6, D. C. General manager: R. G. Atherton.

Oct 17-18, Magnesium Association: Annual convention, Pick-Carter Hotel, Cleveland. Association's address: 122 E. 42nd St., New York 17, N. Y. Executive secretary: Jerry Singleton.

100% FLUID CONTROL AT YOUR FINGERTIPS

with Homestead Lubricated Plug Valves. When open, they provide full pipe-sized passage to fluids. Closed, their controlled high pressure lubricant



system, plus extremely close plug and body tolerance, guarantee a complete chemical seal—positive shut-off without contamination of line fluids. Instant response is sure, too, because piston-like movement of plug during each lubrication prevents sticking. They are low in first cost—low in upkeep. Write for complete details.

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P.O. Box 98, Coraopolis, Pennsylvania

98

Gentlemen: Please send me Catalog 39-1 and prices on Homestead Lubricated Plug Valves

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Company.....

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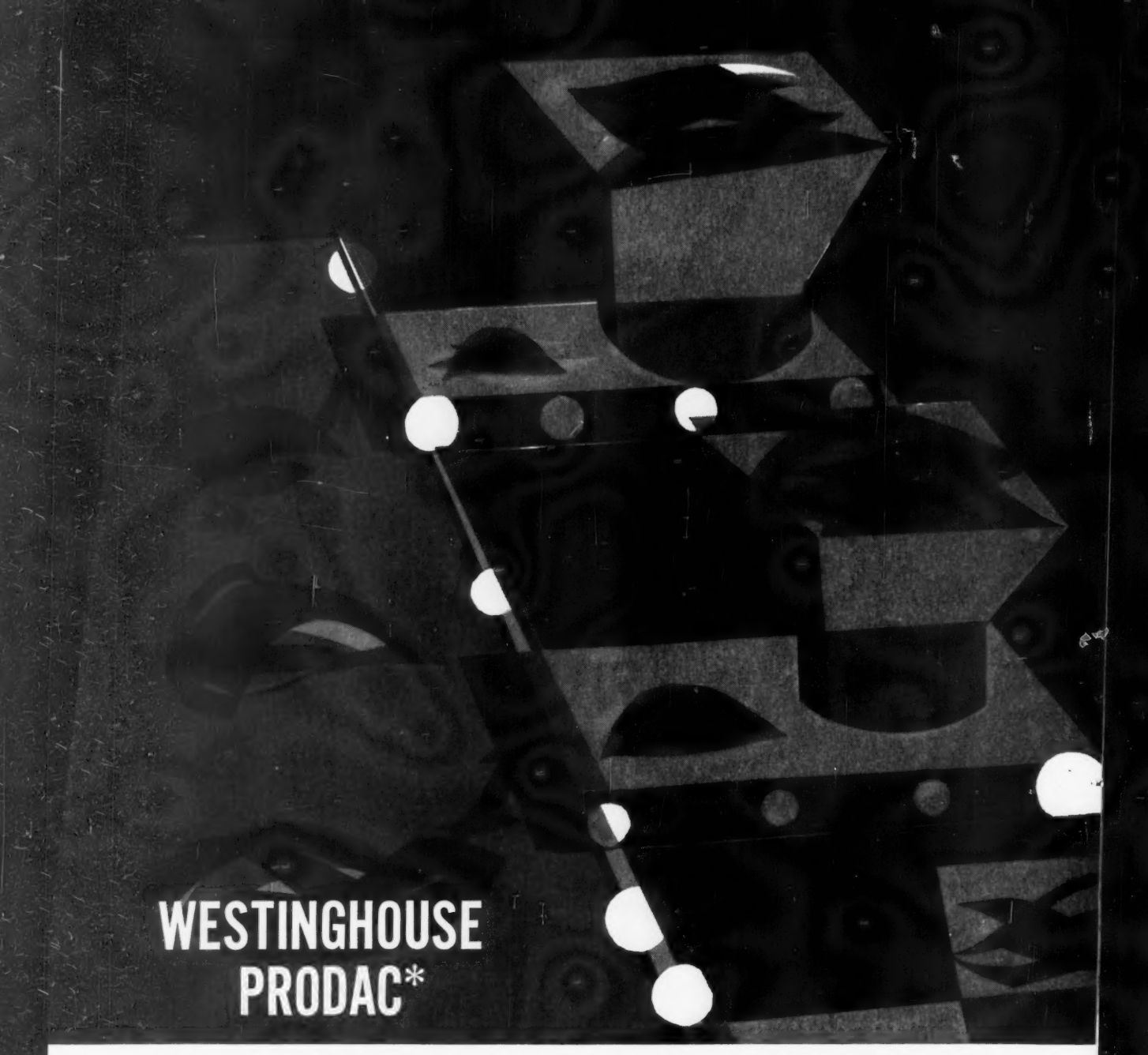

means automatic stocking for blast furnace charging

. . . loads and weighs stock house raw material into the skip hoist . . . delivers predetermined ingredients to furnace at the correct time and in proper sequence . . . maintains permanent record of all furnace loadings and exact time accomplished . . . then indicates when a bin needs refilling or clearing. This is but one of the many ways Westinghouse PRODAC† is helping bring about the "mill of the future" today through completely automatic stocking control for blast furnace charging.

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By specifying Westinghouse PRODAC for your mill, you open the door to many cost-saving benefits which are unobtainable with conventional controls. For example, PRODAC assures the most consistent standards of quality control at the highest rates of production speed . . . coordinates operation of all machines at the over-all maximum efficiency . . . holds maintenance to a minimum and practically eliminates control failures . . . gives you a "building block" design which provides flexibility required for further mill automation.

The entire team of Westinghouse PRODAC engineers is at your service to help you determine exactly where and how PRODAC can benefit you. Your Westinghouse sales engineer can give you complete information, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-22125

*PROGRAMMED DIGITAL AUTOMATIC CONTROL
†Trade-Mark

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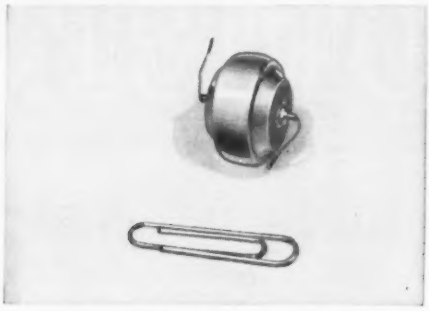
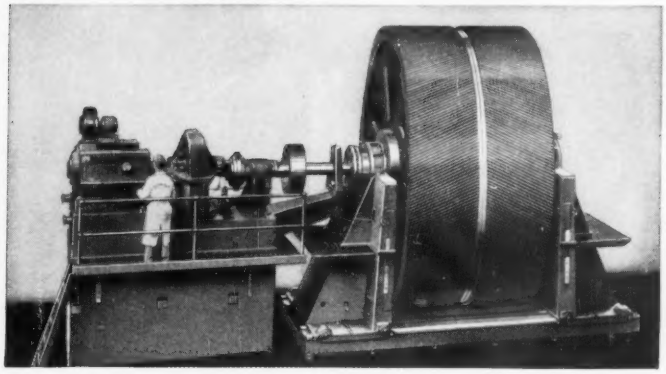
ROTATION WITHOUT VIBRATION



Over 20 standard models in the Gisholt Balancer line handle parts ranging from the small gyro motor (shown compared to a paper clip) to the massive gear shown in a Gisholt Floor-Type U Balancer.

Accuracy? You can measure vibration as small as .000002" on the small gyro motor using an HS Balancer, and vibration as small as .000025" with the large Type U Balancing Machines.



in rotating parts from ¼ oz. to 100,000 lb.

The Gisholt method is fast and simple . . . eliminates guesswork . . . handles single parts or large production runs at lowest cost.

Just load the work and apply rotation. Whether the part requires correction in one or two planes, the angle of unbalance is clearly indicated. The direct-reading amount meter shows how much material must be added or removed — in terms of the correction method most suitable for the work.

Gisholt Balancers are easily equipped with integral correction equipment that permits combining location of angle, measuring of unbalance, correction and inspection in one handling. For full information, call your Gisholt Representative, or write for our Balancing Catalog 1109-C.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

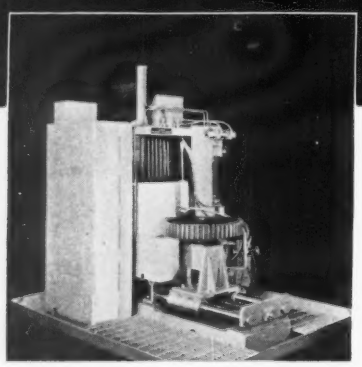
Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers® • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

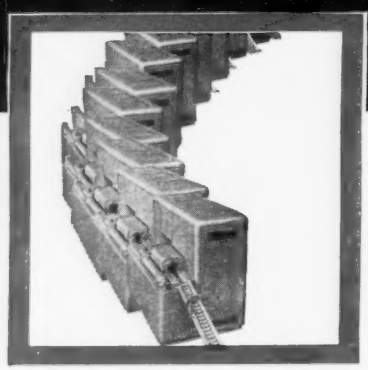
we like to be close to our customers...

and future customers!

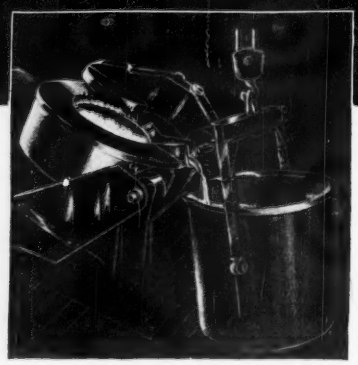
Ajax Magnethermic Representatives are located in major market areas. You will find the telephone number of the office in your area on the opposite page. Whether you want information on an application, or service on an existing installation, the Ajax Magnethermic man can give you assistance. He knows induction heating and melting.



HEAT TREATING . . . AM makes Induction heat treating equipment for either high production or job shop operation. Shown above—the versatile gear hardener . . . heat treats 6" to 60" diameter gears.



BILLET HEATING . . . Press the button, that's all! The AM Billet Heater delivers a billet at exact temperature to the extrusion or forging press.



MELTING . . . AM supplies all types of Induction Melting Furnaces including: core, coreless, lift and automatic pouring, vacuum and degassing.

AJAX Magnethermic CORPORATION

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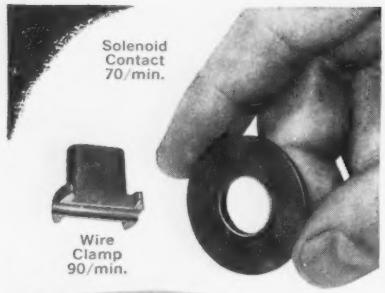
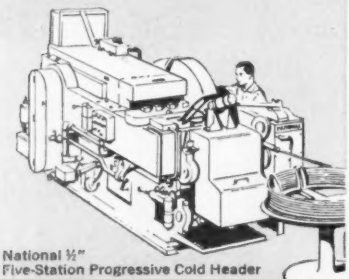


Still more parts from wire!

These important parts are cold-formed from wire, start to finish in compact, efficient National Cold Headers.

Practically scrapless, all these parts achieve remarkable savings over past methods.

If you make odd-shaped parts, may we help you evaluate them for cold-forming from wire? Better yet, come to Tiffin, witness our demonstrations and let's discuss your work.



National ½" Five-Station Progressive Cold Header

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

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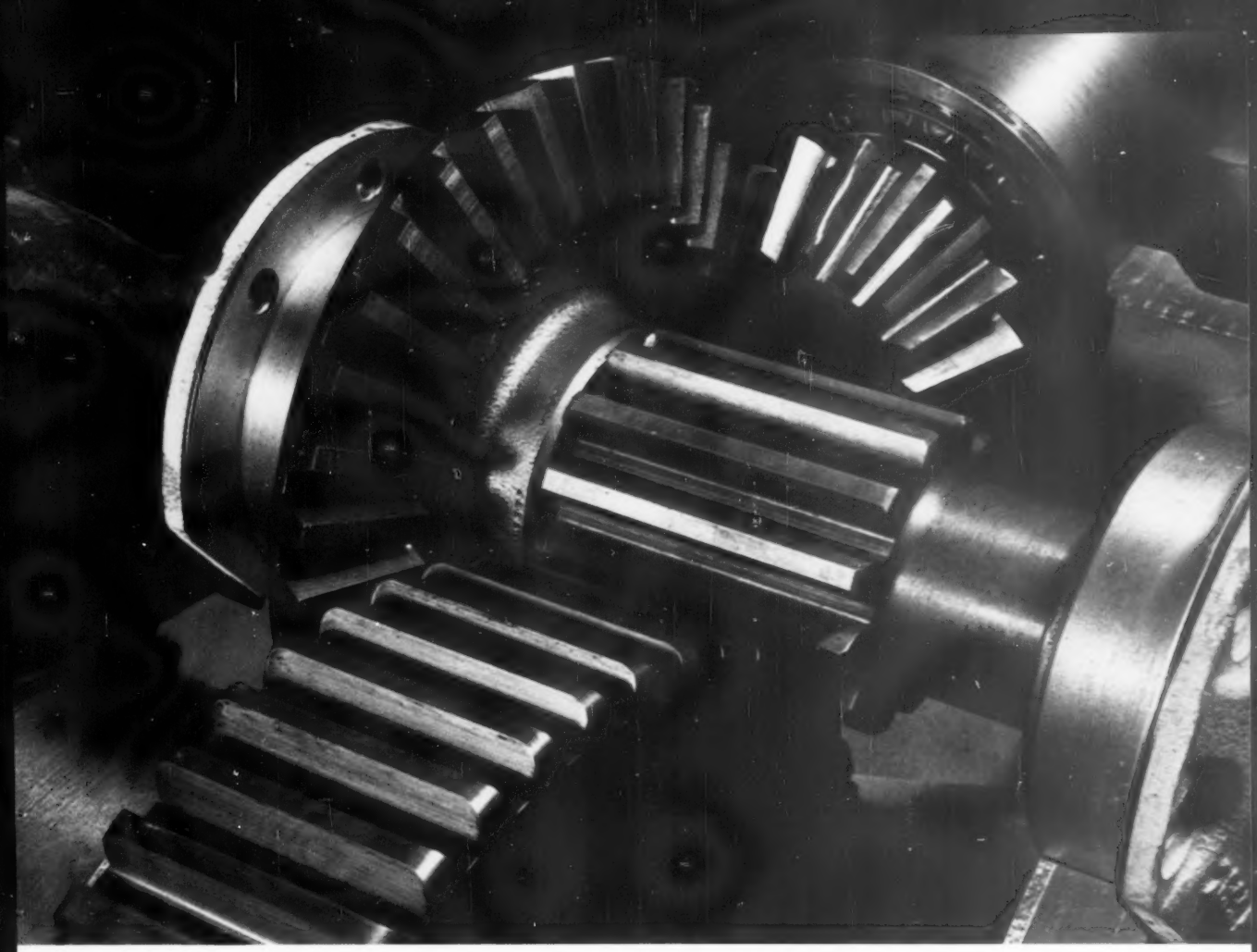


These gears drive the cutting head of a Lee-Norse continuous coal miner. They have superb toughness to resist impact and wear. They're made of AISI 4820, 4320, and 4817 alloy steels.

These teeth are not for chewing

Gear teeth aren't supposed to chew anything (especially each other) because it's so very *expensive.* A broken ten-dollar gear can cost a thousand dollars in down time—so it pays to use the very best alloy steels for gears and other highly stressed parts.

When we make USS Alloy Gear Steels, every production step has one purpose: to prevent failure in actual service. These premium steels forge and machine without distortion. They are dimensionally stable, and they come in the widest possible range of mechanical properties. Be sure to specify USS Alloy Gear Steels: Carburizing steels for toughness, shock and wear resistance; through-hardening steels for heavy loads at slow to medium speeds; cyaniding and nitriding steels for wear.

For information or metallurgical assistance, call our nearest sales office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS is a registered trademark

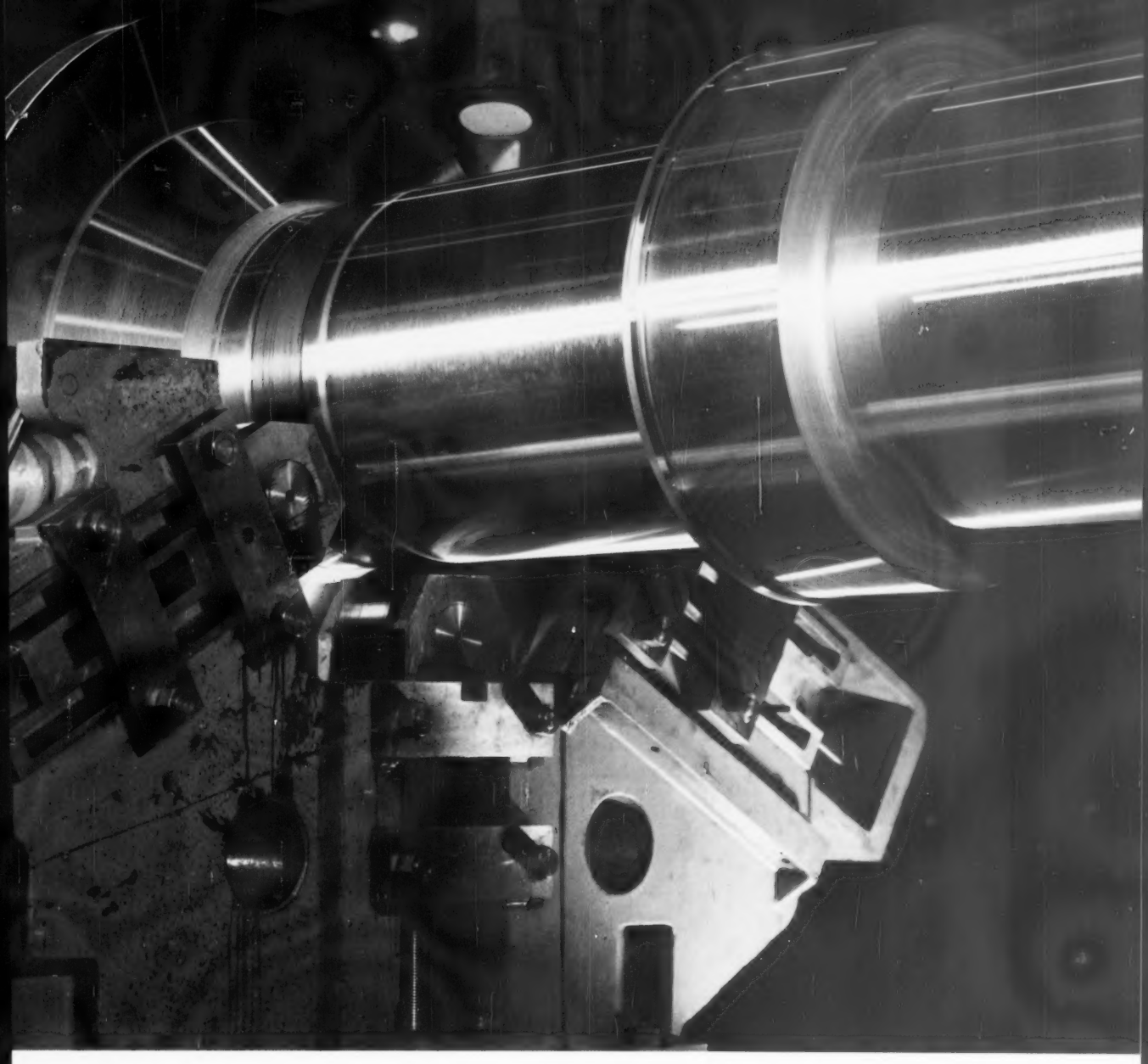
This mark tells you a product is made of modern, dependable Steel.

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company
United States Steel

This USS Forging will perform in Spain

In the main picture, you see a water wheel shaft as it was rough machined in the 120″ lathe at U. S. Steel's Homestead Works. When this USS Quality Forging was completed, it was sent to a major power plant builder where it became a part of a hydro-electric facility which will be erected in Spain. It is used as a connecting shaft between the impeller and the electrical generator. When you consider the high torque imposed upon it, you realize that this forging must be as nearly perfect as men can make it.

The forging was made from carbon steel cast into a 130″ diameter ingot, smooth forged, heat treated, and rough machined as you see it here. The forging was tested and inspected throughout its processing. As shipped,



it weighed 126,000 pounds. Five other similar forgings were delivered to the power plant builder—a total of 378 tons of water wheel shafting.

The gentleman shown at the left is positive that these forgings will perform satisfactorily. As Manager of Forgings Metallurgy at U. S. Steel, G. T. "Ted" Jones has a real and personal interest in the quality of USS Forgings. Water wheels, as well as turbine and generator forgings, are produced to most exacting specifications, but they are all capably handled by U. S. Steel forging experts. These same men can handle your forging requirements. If you would like additional information about USS Quality Forgings, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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USS

"You put on a Payroll Savings Campaign last year...

How many of your employees are still using the plan—every month?"

"Practically ALL of those who signed up are still buying U. S. Savings Bonds every month. We talked to many of them about it, and they told us that the Payroll Plan got them started on their first regular savings program. 'We just couldn't seem to save by ourselves,' they told us. 'This way, we don't even miss the deduction.' Gives us a nice feeling to find out we're helping them to help themselves."

If your company has not installed the Payroll Savings Plan thus far, you, too, may be surprised to find how great a number of your people will welcome this convenient way to start saving. The Plan is simplicity itself to put in. Just contact your State Savings Bonds Director and have him show you just how the Plan works. Let him help you set up a thorough canvass of your company family, so that every employee may be invited to share in this easy way to become a shareholder in America. Experience in other fine companies shows that such an invitation usually results in an enthusiastic response.

ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN ½% MORE THAN BEFORE

STEEL
the Metalworking Weekly

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FLEXIBILITY

Lucas provides

Lever control.

Pendant control

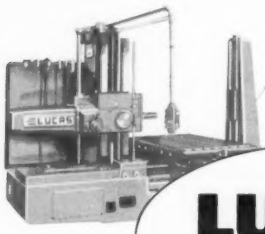
Tape control

and a variety of combinations of the three for flexibility of control suited to the type of work required.

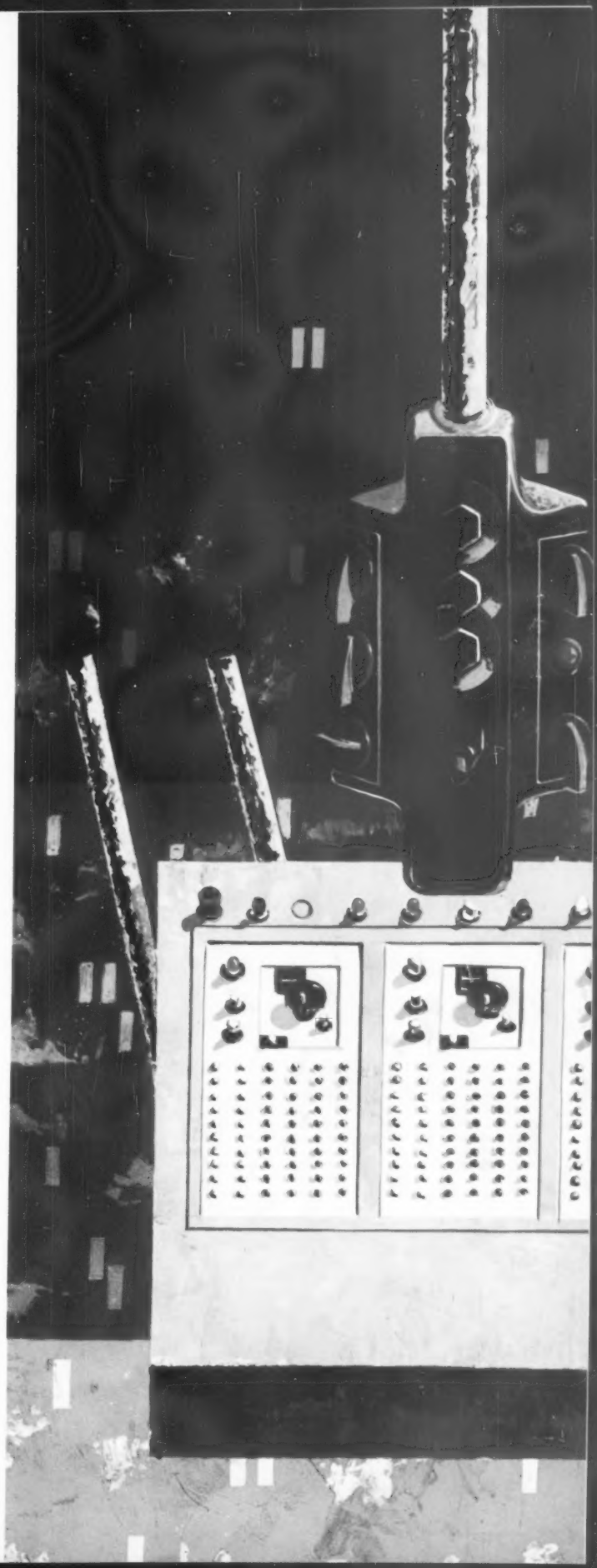
For example . . . The Multiple Control Pendant selects speeds, feeds, unit travels, rapid traverse of head, table, saddle and spindle, plus the rotation of the spindle forward and reverse, jog and stop. Speeds and feeds can be pre-selected while the machine is in operation.

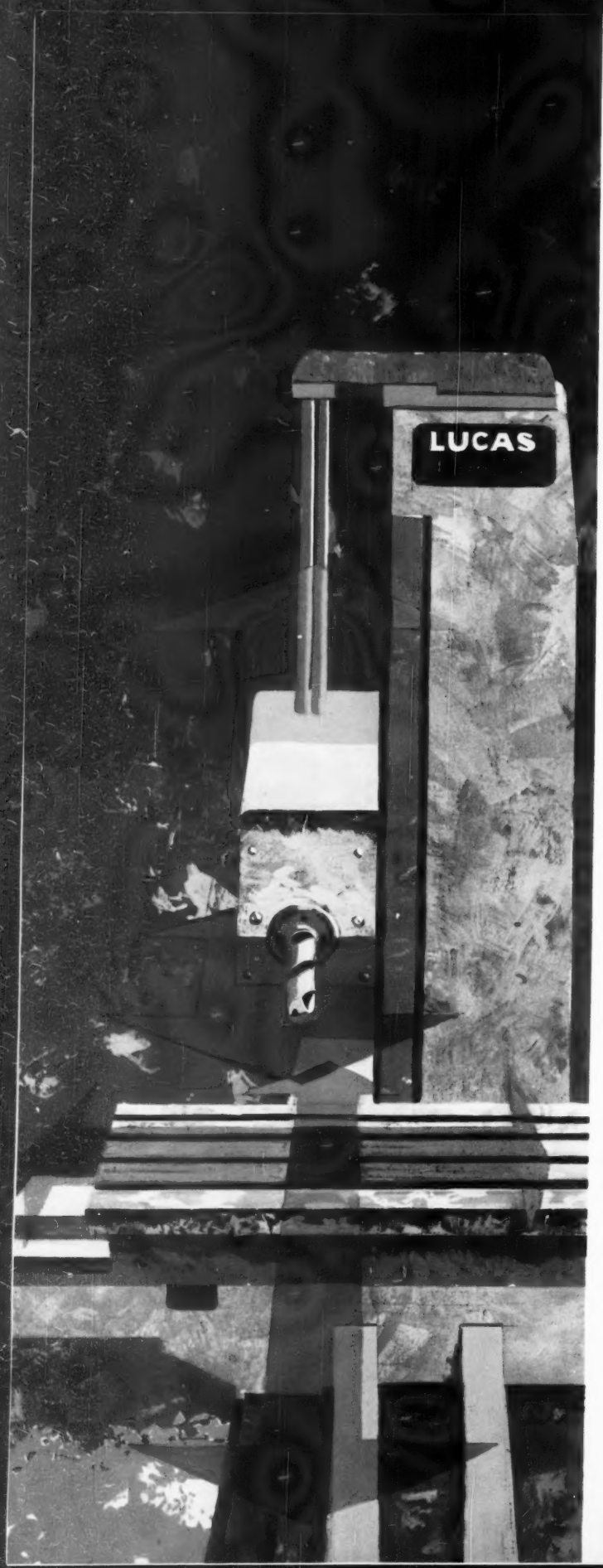
Practical applications of these controls are spelled out in a new catalog. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of flexibility . . .

think of . . .



LUCAS
PRECISION





When you think of VERSATILITY

Lucas feeds the saddle ⇐

Lucas feeds the spindle ⇒

Feeds both in combination ⇒ ⇐

when necessary.

Combine these motions with

Vertical spindle head travel ⇕

and horizontal table travel ⇔

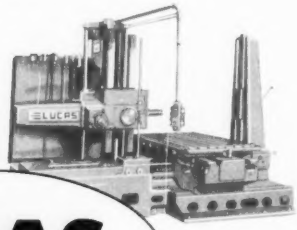
and a rotary table ↻

if you need it.

The result . . . no machine tool can offer a greater combination of usable motions for boring, drilling, milling and related work.

Over twenty models and a dozen major attachments. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of versatility . . .

think of . . .



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CUT INITIAL COST AS MUCH AS 40¢ PER SQ FT

It's easy with the most powerful fluorescent on the market! If you're planning a new building . . . or remodeling an existing one . . . you can shave your customer's initial lighting investment by as much as 40¢ a square foot!

How? Specify G-E Power Groove* Lamps. They give more light than any other lamp. You use fewer lamps, fewer fixtures, fewer everything else it takes to light your customer's building properly. And his savings keep mounting. With fewer lamps, fixtures and ballasts, his maintenance bills will be lower, too.

The secret's in the grooves. They're what bend the arc stream (it's straight in other fluorescents) . . . lengthen it . . . make the lamp put out more light. Only G-E Power Groove Lamps have 'em. Only General Electric gives you this years-ahead light source—another example of a difference that makes a difference in value to you. Call your G-E Lamp distributor for more information. General Electric Company, Large Lamp Dept. C-031, Nela Park, Cleveland 12, O.

*General Electric's trademark for configurated fluorescent lamps

Progress Is Our Most Important Product

GENERAL ELECTRIC

Much of the beauty of Chrysler cars

The proper foundation of a Chrysler-style paint job shows itself in this gleaming Plymouth "body-in-white"—steel with the surface finish a truly fine car must have.

Body parts for Chrysler cars emerge from a complex of huge presses and coils and sheets of flat rolled steel. Floor pans are formed, to be wed further on into single unitized assemblies of 50 major parts by fully-automated resistance welders. Doors are stamped with great precision, and 100 ton presses squeeze out car roofs, without a break or blemish.

This is Chrysler Corporation's Ohio Stamping Plant, giant of the auto industry, where 28 major stamping lines eat 2000 tons of steel a day and produce 600 different body parts. Steel is the basic raw material of this amazing plant—and the men who buy and use it know exactly what they need. As a regular supplier, J&L matches their needs *consistently*.

J&L STEEL

Jones & Laughlin Steel Corporation

3 GATEWAY CENTER, PITTSBURGH 30, PA.

Steel

Feast your eyes on over 1000 lbs. of unadorned steel! Notice how the steel itself contributes to the elegance and grace of Chrysler styling–how, even in this raw metal stage, the "body-in-white" has a lustrous finish of real beauty.

comes from the steel itself

Each die-forming situation is individual and demands a specific set of metallurgical properties from the steel. In many cases, the factor of extreme importance is surface finish of the steel. Other times, drawing quality is paramount. And often, *combinations* of these and other qualities are needed, balanced one against the other with metallurgical precision.

The Ohio Stamping Plant may be big. But it is a tight operation—efficient, competitive, economical, with full control of quality at all times to insure the beauty and soundness of Chrysler bodies. That J&L steel is bought regularly, and used at one time or another in all the major parts produced by the Ohio Stamping Plant, speaks well indeed for J&L quality.

This is the roof line–at full rate of production. J&L is one of only three suppliers who can provide the 80-inch, 0.038-gage coils Chrysler needs here. Breaks and strain lines cannot be tolerated on roofs, so drawing quality is vital–as is surface finish, for reasons of appearance.

◀ This Steelmark identifies products made of steel. Look for it when you buy.

With one pledge you give a helping hand to so many

When you make your one big pledge to your town's united campaign, you are actually giving to many campaigns in one. Your contribution fights disaster and disease, works to prevent juvenile delinquency, and attacks the problems of the aging and the breakdown of family life. United Way pledges support 27,700 local, state, and national agencies which serve 77,400,000 Americans. When a United Way Volunteer asks you to give, welcome him with your pledge.

GIVE THE UNITED WAY

designed and built by . . .

UNITED®

HIGH SPEED
5-STAND
TANDEM COLD MILL

UNITED

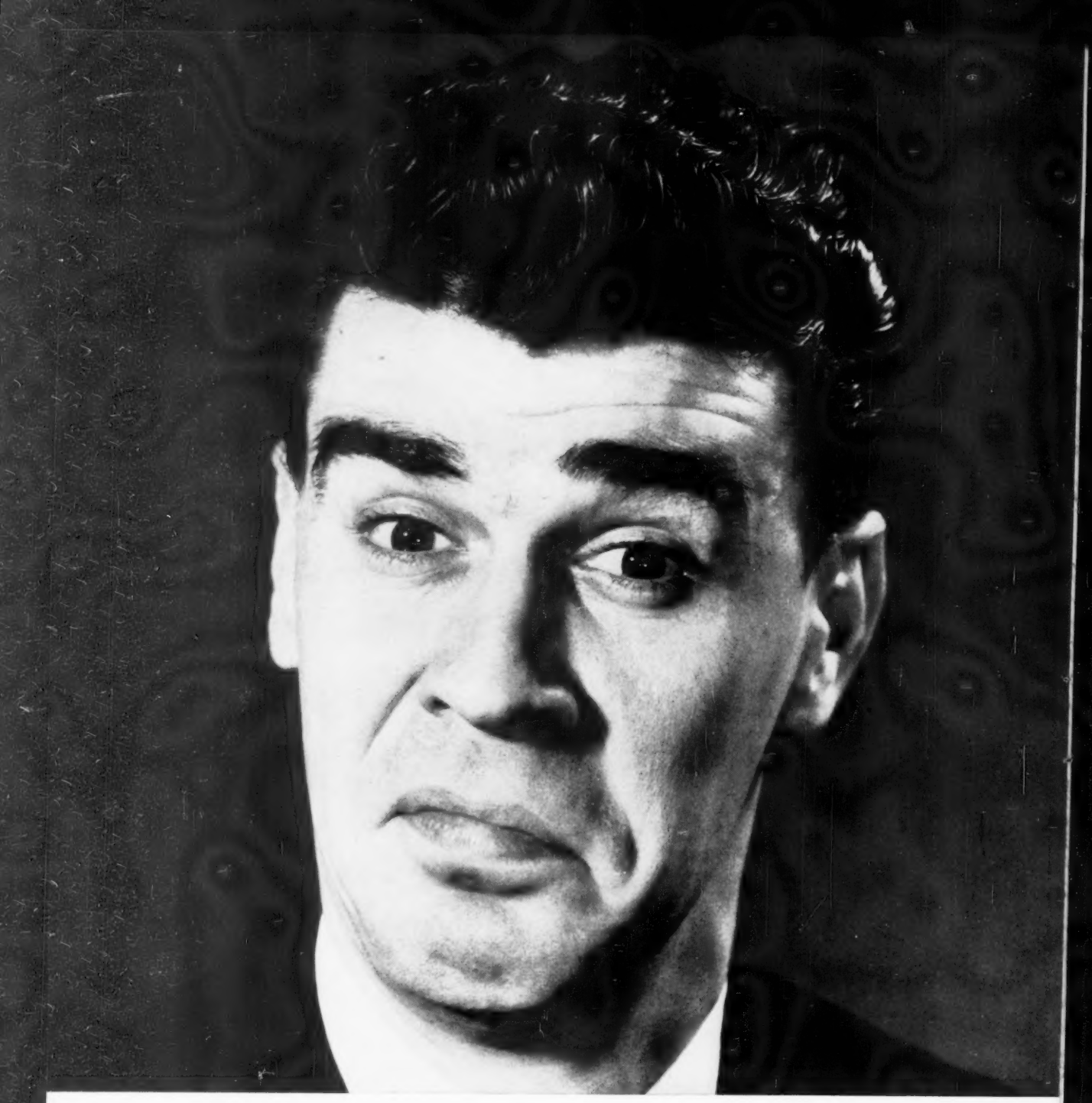
ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.



"Two metalworking machines for the price of one?"

"I didn't believe it until a Ryerson machinery specialist showed me how.

"As a fabricator of stainless steel kitchen equipment, I was recently looking for a new squaring shear. I was considering one with a gap-type frame that would do my regular shearing, and an important notching operation as well. But when a Ryerson machinery specialist studied the problem, he recommended *two* pieces of equipment instead of one—at no increase in total cost. I got an underdriven shear and a universal metalworking machine that would do my notching plus many other jobs—adding versatility to my entire operation."

Why not have Ryerson study *your* machinery requirements? You'll get unbiased recommendations and a choice of 2800 different pieces of metalworking equipment. Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Illinois.

STEEL
The Metalworking Weekly

Metalworking Week®

October 3, 1960

Pritchard Is New AISE President

C. E. Pritchard (photo), general superintendent of rolling mills for Alan Wood Steel Co., has been elected president of the Association of Iron & Steel Engineers. H. L. Jenter, vice president-operations, American Steel & Wire, is first vice president and C. W. Bruce, chief engineer of steel plants, Republic Steel Corp., is second vice president. N. C. Michels, vice president-engineering, Tennessee Coal & Iron, is secretary; H. R. Knust, assistant general manager, Bethlehem Steel's Sparrows Point plant, becomes treasurer.

Crucible Buys into Italian Steelmaker

In a move cited by industry observers as the beginning of a trend, World Crucible Ltd., subsidiary of Crucible Steel Co. of America, purchased a 75 per cent interest in Vanzetti of Milan, Italy. Joel Hunter, Crucible Steel president, said Vanzetti is building a new, $5 million plant which will more than double the firm's present capacity of 7500 tons a year.

India's Steel Industry Frustrated by Coal Shortage

After rushing to build new steel plants with aid from Russia, England, and West Germany, India is now unable to put them into full production. Reason: A shortage of metallurgical coal. Most of such coal deposits in India are owned by private sources, who reportedly are none too co-operative in aiding the publicly owned plants. The Indian steel industry also suffers from lack of experienced management and inadequate rail facilities.

Maytag's Umbreit Hits Artificial Obsolescence

George M. Umbreit, president, Maytag Co., told the American Home Laundry Manufacturers' Association that artificial obsolescence is " a deterrent to customer satisfaction — the most basic factor in business." He said product quality could be better maintained if a firm's manufacturing processes, assembly lines, and sources of supply were not upset every 12 months by the model change. "We believe that customers become strongly motivated to buy new products when it becomes evident that it will do things not possible with an earlier model," he asserted.

Machine Tools, Structurals Have Good Month

New orders for metal cutting machine tools totaled $49.45 million in August for the best showing since July, 1959, and the third best month since July, 1957. Foreign orders accounted for $12.25 million of the total, National Machine Tool Builders' Association notes. However, orders for metal forming

Technical Outlook—Page 69 Market Outlook—Page 97

machine tools in August fell to the lowest level of the year at $8.1 million . . . American Institute of Steel Construction says August bookings of structural steel fell slightly from the July mark, but were 33 per cent above the August, 1959, level.

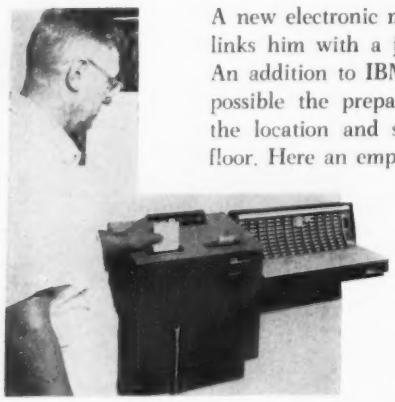
Industry Speeds Product Development

The average U. S. industrial firm will spend 10.7 per cent more for new product development this year than last, finds a midyear survey of 402 companies by American Management Association. The average firm poured 3.7 per cent of its sales dollar into development last year, the survey learned. Machinery makers are spending 22 per cent more this year than last; electronics firms are boosting their budgets 16.8 per cent; instrument makers are hiking outlays by 14 per cent.

USW Rebels Suffer Setback

The insurgent group within the United Steelworkers suffered a serious setback when its candidate for union vice president, Joseph Murray (adopted son of the late Philip Murray, founder of the union) took the floor at the USW convention to say he was "shocked" to learn that his name had become associated with the rebel group, headed by Donald C. Rarick. Mr. Murray said his name had been used without his knowledge and charged that the rebel group was attempting "to trade on the name of my great father." Mr. Rarick countered that Mr. Murray had been sent to the insurgents as a "plant in a game of duplicity and treachery unparalleled in the American labor movement."

New Machine Reads Employees' Badges



A new electronic machine reads an employee's badge and links him with a job for reporting and payroll purposes. An addition to IBM's 357 data collection system, it makes possible the preparation of up-to-the-minute reports on the location and status of every job on the production floor. Here an employee inserts his plastic badge, punched with his "man" number and his department number, into the reading slot of the input station (center). Data from the badge and the punched job card in the reading slot (left) and from the manual entry (right) are flashed to the control center by cable.

Computer Industry Booming; Competition Toughening

The booming computer industry will become even more competitive as manufacturers vie for customers through the lure of increased services as well as new products. General Electric Co., for example, will open 11 new data processing centers in major cities in the next two years. Radio Corp. of

America says its data processing business is running at a rate of $135 million annually—twice the 1959 pace. And C-E-I-R Inc. has placed an order with IBM for a "Stretch" data processing system which the firm calls "the most powerful and versatile in the world." It can handle 75 billion computations a day and execute 2 million instructions per second. IBM says the "Stretch" is 75 times faster than the 704 and 15 times faster than the 7090.

Ford Scientists Study Three-Man Space Vehicle

A team of scientists at Ford Motor Co.'s Aeronutronic Div. (examining cylindrical test specimen at left) is studying a three man space vehicle. The double walled, compartmentized vehicle at right is one design possibility. Gases are circulated within the walls to keep the vehicle comfortable.

Economist Sees Recession

John K. Langum, Business Economics Inc., Chicago, told the National Foundry Association meeting that the country is heading into a recession. But he emphasized that it will be marked more by difficulty in going ahead than by further dropping off. He said demand for capital goods will weaken.

Average State Tax Now Tops $100 per Person

The average, per capita, state tax bill in the U. S. reached $101.72 in the year ended June 30, 1960, reports Commerce Clearing House, Chicago. Here are 1960 per capita tax burdens in major metalworking states:

New York	$118	California	$137	Connecticut	$95	Indiana	$86
Pennsylvania	92	Michigan	118	Massachusetts	96	Washington	163
Illinois	84	New Jersey	60	Missouri	73	Texas	82
Ohio	90	Wisconsin	108	West Virginia	97	Minnesota	104

U. S. Investment Abroad Exceeds $30 Billion

U. S. companies now have more than $30 billion invested in foreign facilities, finds a new study by the Commerce Department. About $2.5 billion was added last year—through capital outflows of $1.4 billion and reinvested earnings of $1.1 billion. Early reports indicate that slightly less will be invested abroad this year. Much of the increase in the flow of capital abroad has gone to Germany, France, Italy, and Netherlands.

Import Invasion: More New Beachheads

Imports of low cost cigaret lighters in the first half of 1960 rose 70 per cent above the total for 1959's first half . . . West Germany shipped 4515 sporting rifles into the U. S. last year . . . Imports of bicycles and parts in the first half of this year totaled $11.9 million—up 28 per cent from the total in the

like 1959 period . . . U. S. imports of electronic products from the United Kingdom during 1960's first quarter fell 8 per cent from the total in 1959's first period. So reports the Commerce Department.

Russians List Steel Expansion Projects

Two Russians—Ivan Denisenko, economist, Economic Research Institute, and Roman Belan, head of the Iron & Steel Industry Department, State Planning Commission—give a list of steel industry projects in a paper they wrote for the Associafion of Iron & Steel Engineers convention last week; the Russians were unable to attend. The Russian seven year program calls for these steel industry programs in 1960: Startup of five large blast furnaces, ten large open hearths, three electric furnaces, six rolling mills, pipemaking facilities, and eight batteries of coke ovens. Russia plans to produce 100 million net tons of steel in 1965. The country had 116 blast furnaces operating at the end of 1959.

Renault Chief Sees U. S. Market Tougher to Crack

Pierre Dreyfus, head of Renault automobile firm in France, believes next year "will be tough" for the sale of European small cars in the U. S. Renault has cut the workweek from 48 to 45 hours for half of its 60,000 employees.

Straws in the Wind

Eight Japanese steel mills are negotiating with Russia to import 500,000 tons of Soviet coal annually . . . Railroads predict a 6.1 per cent increase in freight carloadings in the fourth quarter of this year vs. the like period of '59 . . . In the next decade, the U. S. "will build enough generating capacity to power another U. S.," declares A. C. Monteith, Westinghouse Electric vice president . . . E. A. Garber, president, Harbison-Walker Refractories Co., looks for "a gradual improvement in business" (for other comments from steel industry suppliers, see Page 44) . . . Fairchild Engine & Airplane Corp. is planning to build aluminum, outboard, pleasure boats; Reynolds Metals Co. will supply the aluminum . . . Coal mining operations of Tennessee Coal & Iron were halted last week by a wildcat strike of 1700 miners . . . New business incorporations in August reached the highest level for any August on record, reports Dun & Bradstreet Inc., while business failures hit the highest point for any August in 27 years.

Metalworking Pulse

The Business Trend: A gain of 5 points put STEEL's index at the highest level in seven weeks —evidence of a moderate fall upturn. **Autos:** Chrysler Corp. is already cutting back on 1961 model production. The industry as a whole must produce at or above the current level through October to come anywhere near its original goal. **Steel:** Lacking marked improvement in demand from major consumers, output was held near 1.5 million tons.

- **INDUSTRIAL PRODUCTION**
  - Week ended Sept. 24 . . . **149†**
  - Year ago **114**

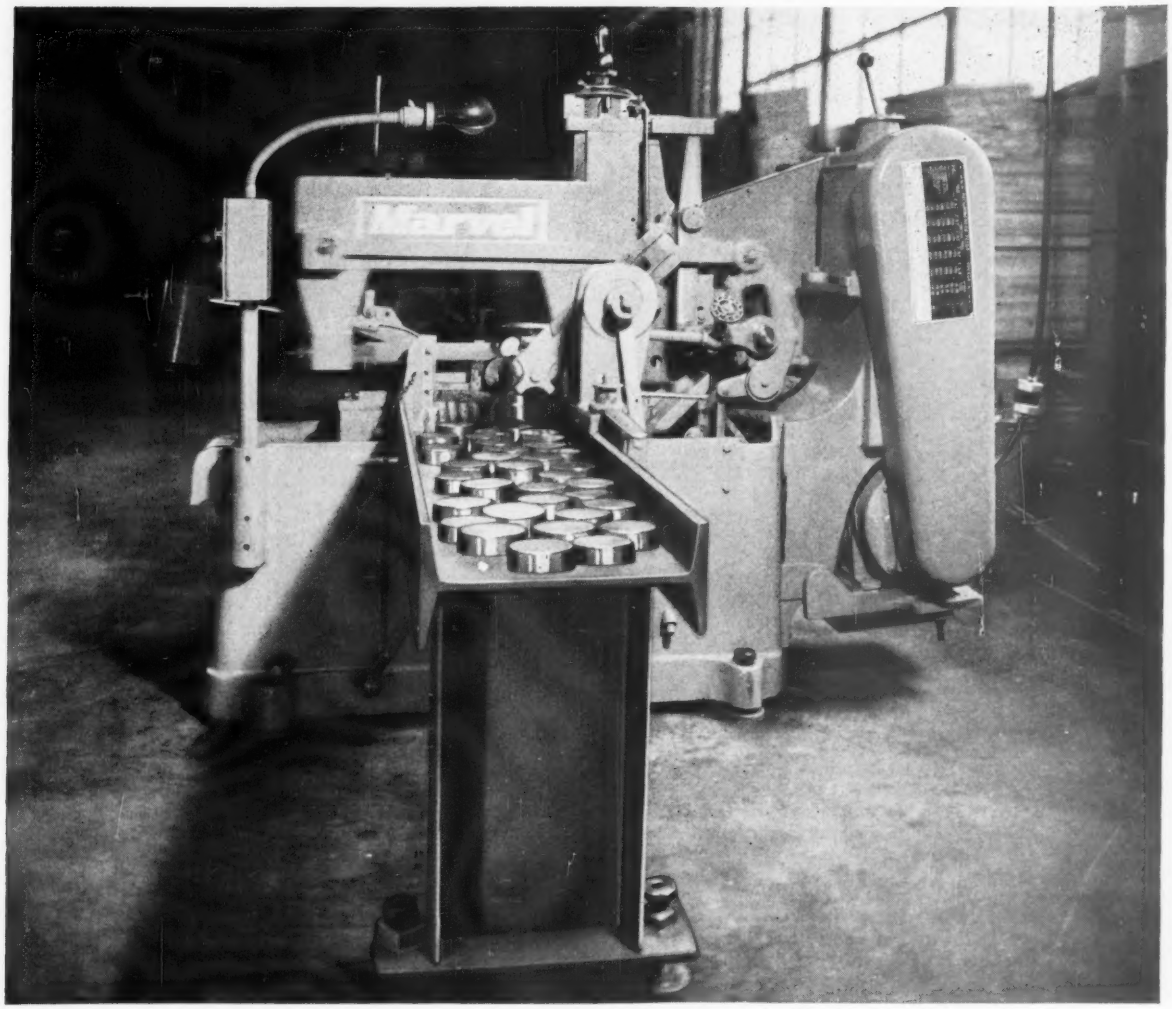
  Details on Page 59
- **PASSENGER CAR PRODUCTION**
  - Week ended Oct. 1 . . **130,000***
  - Year ago **105,720**

  Details on Page 56
- **INGOT PRODUCTION RATE**
  - Week ended Oct. 2 . . **54.2%†**
  - Week ago **54.3%**

  Details on Page 102

†Preliminary. *Estimated.

Copyright 1960 by STEEL, Penton Building, Cleveland 13, Ohio



Payoff End of a Production Marvel

A cut-off saw's value is proven at the discharge end of the machine. How quickly the trough is filled with accurately cut-off pieces can mean the difference between profit and loss on many jobs.

The R. J. Sudrick Co., Des Plaines, Illinois, manufacturers of precision aircraft components had to cut-off 4600 blanks from 3¼" round, 303 Stainless Steel Bars.

They bought our MARVEL No. 6A4 High Speed Heavy Duty Automatic Bar Feed Hack Saw Machine; used MARVEL High-Speed-Edge Hack Saw Blades, and got the high production, accuracy and economy they desired.

PRODUCTION? Constant at 20 pieces per hour floor to floor

ACCURACY? Held well within the permissible tolerance of +.010 —.000

BLADE COST? Just 1½¢ per cut. Only twenty-three MARVEL blades were needed to make the 4600 cuts, and not a single blade failure due to blade breakage. MARVEL High-Speed-Edge Blades are unbreakable.

The point is this: MARVEL Metal Cutting Hack Saws equipped with MARVEL High-Speed-Edge Hack Saw Blades are an unbeatable combination for economical, accurate and safe cutting-off.

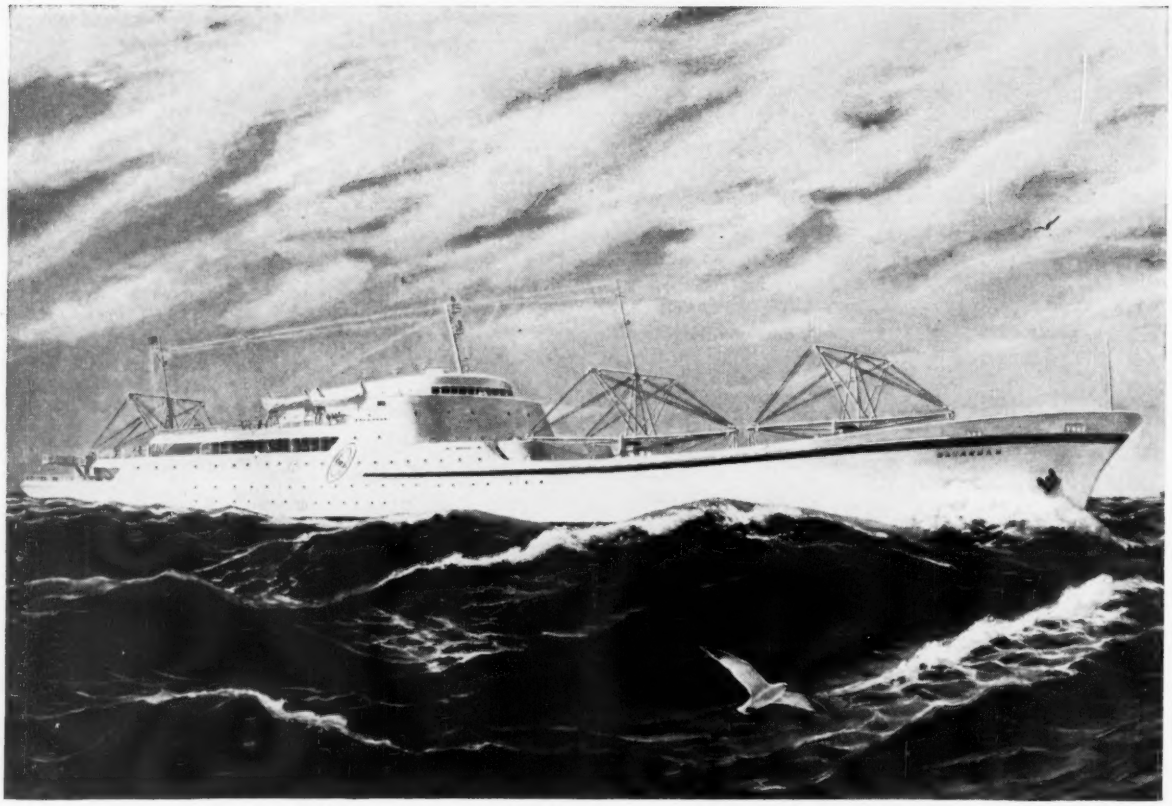
If your hack saws are not producing the economy you need to meet today's competition, try MARVEL High-Speed-Edge Blades. They will give you the competitive edge every time. Write for Catalog C-85 which has the complete story on MARVEL Hack Saws and Band Saws, Hack Saw Blades and Band Saw Blades.

ARMSTRONG-BLUM MFG. CO.

5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

MARVEL Metal Cutting SAWS

Better Machines—Better Blades



N.S. Savannah, built by New York Shipbuilding Corporation, can sail for three years on 138 pounds of nuclear fuel. A conventional ship would burn 80,000 tons of oil.

'round the world 13 times with fuel to spare ...the first nuclear-powered merchant ship

This is the Nuclear Ship Savannah, first of her kind. Capable of sailing over 350,000 nautical miles without re-fueling, she points the way to a new era in transport and travel at sea.

Her uranium oxide fuel is packaged in tubes of Nickel Stainless Steel...*more than 5,000 of them.* The fuel-element cans that hold these tubes are also made of this strong, corrosion-resisting metal.

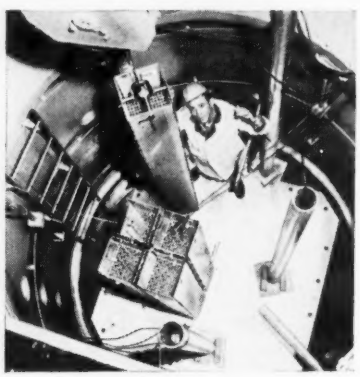
Wherever you look, inside the reactor, almost everything is Nickel Stainless Steel. 200,000 pounds of it are used in the reactor area: for the lining of the reactor vessel, for the coolant pumps and tubing that circulate corrosive "hungry" water, and for the control rods inside the atomic pile.

At the design stage, engineers anticipated the high operating pressures—1,750 pounds per square inch—and temperatures up to 508 °F. They selected Nickel Stainless Steels to provide the strength and resistance to heat and corrosion needed to withstand these rigorous conditions.

So the next time you need more from a metal, remember the N.S. Savannah. Nickel Stainless Steel, or another Nickel alloy, may be the solution to *your* problem, too.

A note to Inco will bring you "First Steps Towards Solving Specific Corrosion Problems" and "High Temperature Worksheet"... simplified forms you can use to describe your metal problem. Perhaps our technical staff has information that will help you find the solution.

The International Nickel Company, Inc.
67 Wall Street New York 5, N.Y.



Inside the reactor nearly everything you see is Nickel Stainless Steel to withstand corrosion, high temperatures and pressures that hit 1,750 psi. Reactor built by Babcock & Wilcox Co., Barberton, Ohio.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Beware the Bugbears

"This is the year the fuse will be lighted for the biggest boom in metalworking's history."

That quotation is from the Jan. 4, 1960, issue of STEEL. It reflected—at that time—the thinking of several thousand metalworking managers queried in this magazine's survey of metalworking business expectations. Most economists agreed —ten months ago.

Why hasn't the boom developed?

From the vantage point of hindsight, it's easy to see what happened. In the words of an economist: "We can plot the economic indicators precisely. We can carefully forecast the probable demand for goods and services. We can check and recheck our figures and find them perfect. But the actual results don't jibe with our forecasts.

"The trouble is that we are dealing with statistics. The economy is made up of people. And people just won't act like statistics."

Certainly, this is a year which demonstrates that people reactions are a great determinant in the health of our economy. Certainly, this is a year which proves that emotional factors do influence industrial purchases—or the lack of them.

Early this year, a survey by the editors indicated the metalworking industry needed more than $20 billion worth of capital equipment to achieve optimum production efficiency.

A more recent study shows actual expenditures for capital equipment this year will approximate $4.7 billion.

We suspect that emotional factors—fear, inertia, indifference, and procrastination—are important reasons why actual buying of equipment is falling so far short of the need. They are the bugbears of 1960.

Both builders and users will have to recognize those bogies, expose them, and seek ways to fight them.

We suggest that venders should make the first move by providing better information, by involving the prospect personally with the benefits of purchase, by creating incentives for action, by assuring that better equipment is the way to success, and by providing impetus for action.

When we recognize that there are emotional as well as rational factors in industrial buying, we will be in a better position to plan our marketing. We will be in a better position to re-equip our industry.

Then we will be in a better position to resist foreign competition, to reduce our costs, and to improve our profits.

Walter J. Campbell

EDITOR

CF&I WIRE HELPS

"CF&I-Wickwire Wire Spiders give us 25% increase in productivity...20% less downtime... 80% less scrap loss," says Mr. Robert Mangold, Production Superintendent.

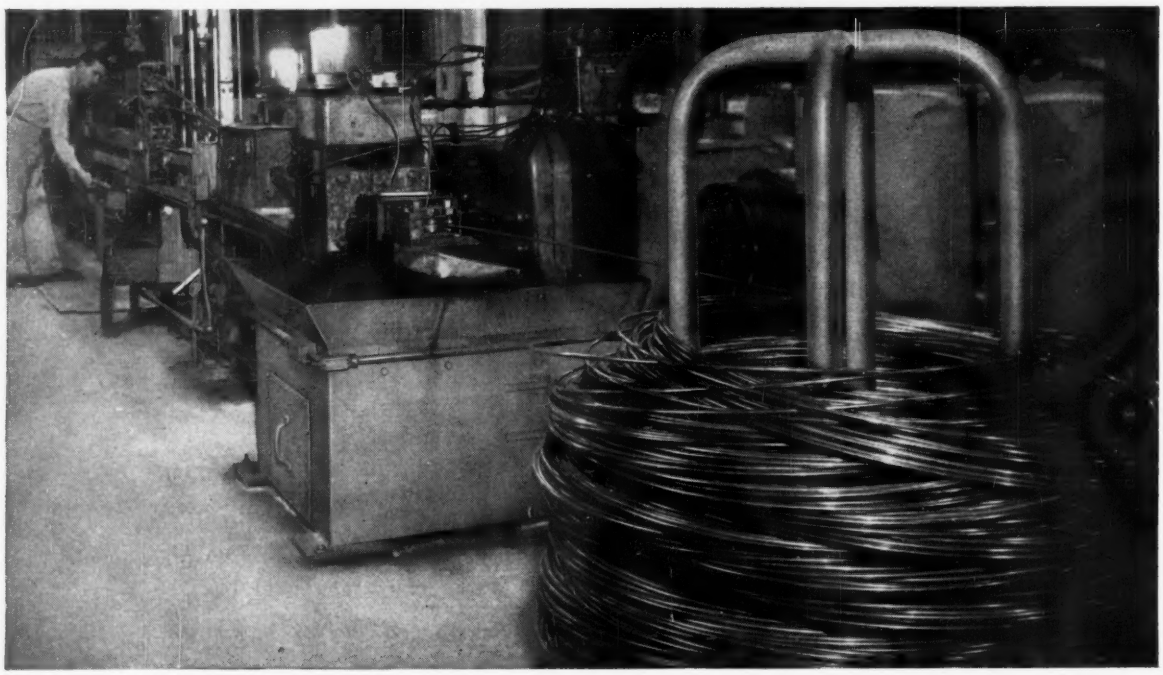
25% Increased Production—"Previously it required fifteen or twenty minutes to reset *each* of the eight to ten small coils used to feed our forming machine," explained Mr. Mangold. "For every eight hour shift, we lost two hours of production. Now with CF&I Spiders—which hold up to a 3000 lb. continuous length of wire—we change coils only once each shift. We save two hours per shift."

80% Less Scrap Loss—"Waste is an important consideration because we lost several feet every time we changed coils. Now we use only one and one-third CF&I Spiders each shift—instead of the eight or ten coils used previously—and have cut our waste 80%."

Increased Safety—"With small coils there was always the danger of the finishing end springing loose while rotating and striking equipment and personnel. With heavy-weight CF&I Spiders which revolve on a turntable while our machine withdraws the wire, the finishing end is securely anchored, reducing the possibility of tangling and eliminating this danger."

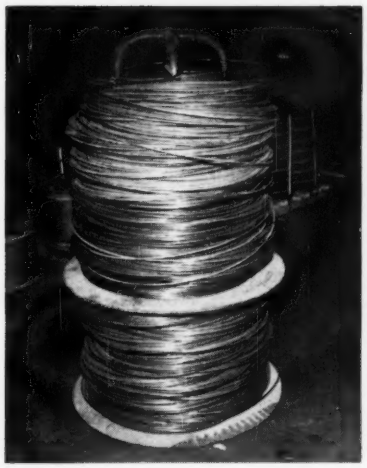
Improved Quality of End Products—"Since we do not have to reset the machine ten times a shift, the quality of our product is more uniform and we have fewer rejects," declared the superintendent of production. For a continuous operation, the end of one Spider can be butt welded to the start of another.

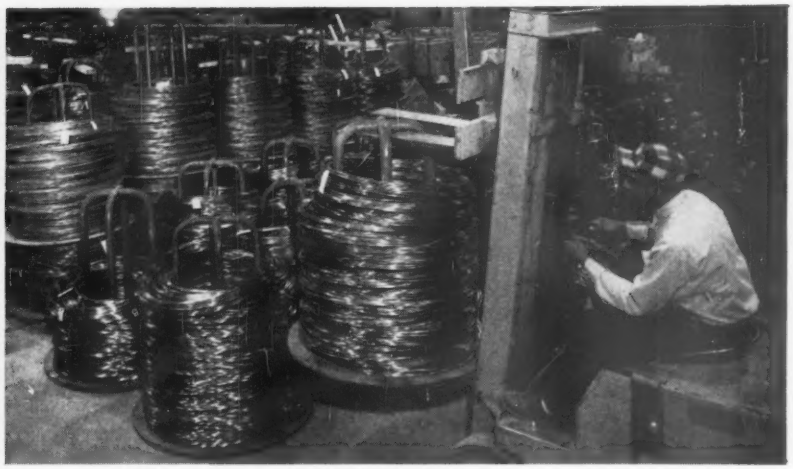
Reduced Handling Costs—"These sturdy Spiders have reduced our handling and storage problems, because each



INCREASE PRODUCTION 25%, CUT MANUFACTURING COSTS

At Bridgeport Brass Co., Flemington, N. J.





Spider contains as much wire as eight small coils. Unloading is safe and quick—one man with a fork lift can do the job easily, freeing several men for other important operations," Mr. Mangold pointed out.

Simplified Inventory Control—No need to sort through piles of wire coils...simply count the number of upright Spiders.

Save Storage Space—Spiders are stored compactly, requiring much less space than cumbersome coils. For maximum economy of space, Spiders can be doubled-decked which is equivalent to stacking 20 mill coils of 300 lbs.

Every CF&I Wire package offers one or more of the following benefits:

- **Reduced downtime through extra long continuous lengths of wire**
- **Simplified inventory control**
- **Fast, economical unloading and in-plant handling**
- **Continued cleanliness of the wire**

A CF&I representative will be glad to discuss your operation with you and recommend the wire package that will help save you time and money.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I OFFICE IN CANADA: Montreal

CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

6930

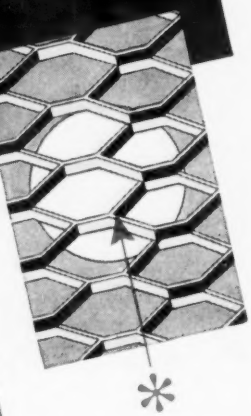
a *rugged* Cleveland Speed Variator keeps Steel Lath quality at top level

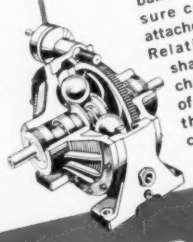
Playing an important role in the production of perforated metal lath is a heavy-duty Cleveland Speed Variator. This novel lathing "keys for keeps" because applied plaster is automatically guided into a positive locked-in position by the precise twist * engineered into the work.

Driving the lath machine's leveller is the job assigned to the Speed Variator. It's a mighty important function because leveller speed has to be in absolute synchronization with expander speed. If not, lath will buckle or expand too much. Then lath is rejected—profits drop.

With their Cleveland Speed Variator, the lath producer is able to maintain set speeds—without *any* variance. Changing speeds, if desired, is merely a simple twist-of-the-wrist.

Wherever there's a Cleveland to handle the job smoother, quieter, more efficiently. Write for your free copy of Variator Bulletin K-200—it gives the complete engineering story.





HOW IT WORKS

Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts. Relative speeds of the shafts are adjusted by changing the positioning of the axles on which the balls rotate (see cutaway view.).

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

EATON

CLEVELAND SPEED VARIATOR

STEEL's Panel of Economic Consultants Predicts...

Housing to Lead Upturn in 1961

Median estimate of STEEL's Panel of Economic Consultants.

"IT SEEMS ridiculous to consider a possible business recession when our nation is in a world struggle against Communism. Unfortunately, the behavior of the leading indicators and the softening of the economy suggests this unthinkable recession may indeed occur."

That statement by a member of STEEL's Panel of Economic Consultants reflects the thinking of many members in the second semiannual business survey and recognizes what many businessmen have been trying to avoid for several months: The fourth post-World War II recession. (For the names of panelists, see Page 41.)

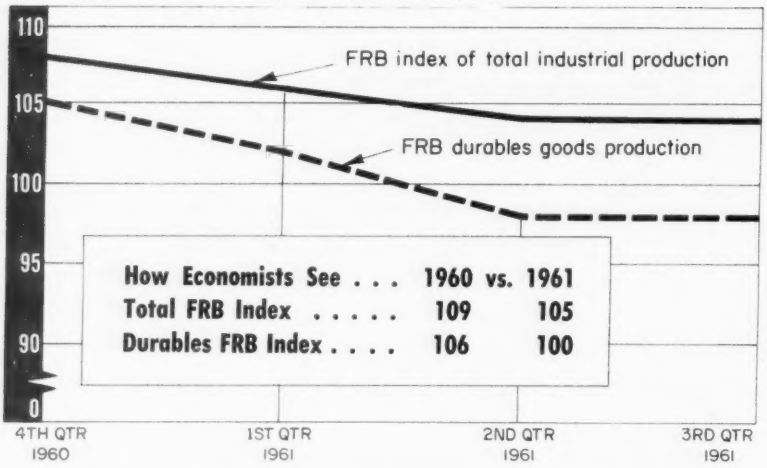
• **Short and Shallow**—But 75 per cent of the respondents declare that the fourth recession will be less severe than any of the other three, both in time (about nine months) and depth (a maximum of 15 per cent beneath the January, 1960, peak).

On that basis, the bottom should be reached during the first half of 1961, with an upswing evident by the third quarter. Says W. H. Finigan, director, marketing research, National Cash Register Co., Dayton, Ohio: "The economic trend line for 1960 and 1961 will resemble a saucer."

• **Durables Take Brunt**—As in previous economic adjustments, the durable goods sector is in for the roughest time, the panel thinks. (See graph, Page 40.) Not only will it dip farther, but it will also be slower to respond to the stimuli which the economists count on for recovery next year. The brightest spot in the durables picture is housing (see display above), which was one of the

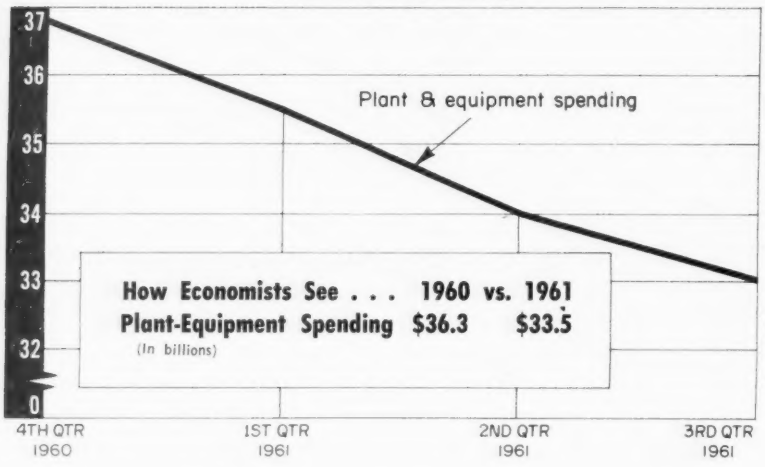
Another Durables Recession Shaping Up . . .

(1957=100, seasonally adjusted)



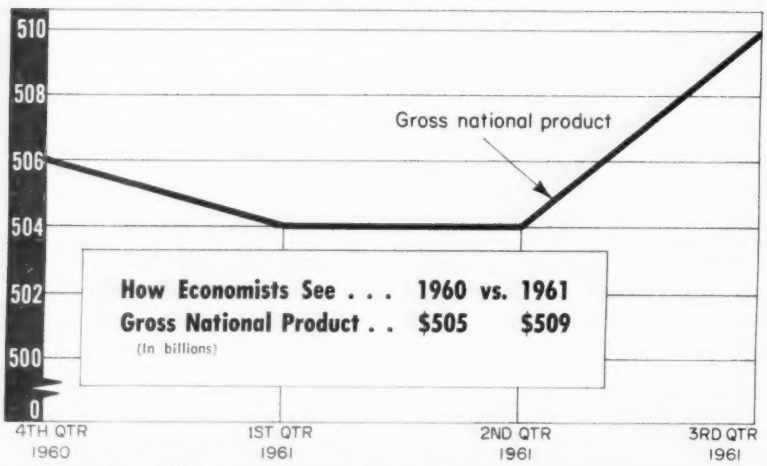
As Industrial Expansion-Modernization Slows Down . . .

(Annual rate in billions of dollars)



But Nondurables, Services Will Keep Economy High

(Annual rate in billions of dollars)



Median estimates of STEEL's Panel of Economic Consultants.

first industries to take the tumble this year. Other than that, they feel the upward push will come from increased spending for nondurables and emergency government programs. So it is entirely possible that gross national product and industrial activity during part of 1961 will be going in opposite directions.

As George W. Coleman, economist for Mercantile Trust Co., St. Louis, puts it: "Government expenditures can moderate the effect of declining business activity, but I do not believe that, with the economy organized as it is now, government spending can stimulate industrial activity."

• **Cite Other Moderators**—In all, the panelists suggest 12 reasons why this will not be as severe a recession as the previous three. In order of frequency mentioned, they are:

1. Much of the inventory adjustment associated with business declines is behind us, especially in steel. A turnabout from liquidation to accumulation could have a major effect on business next year.

2. Regardless of which candidate is elected President, it is clear that some emergency action will be taken to feed money into the sagging economy.

3. No serious excesses were built up in the last uptrend, so little correction is needed.

4. Federal action in reducing interest rates and easing up on the money supply earlier than in previous recessions will stimulate both business and private spending.

5. Plant and equipment spending in the last upswing was low in relation to economic activity and should not decline as much as it did in 1957-58. (See graph at left. For a more optimistic viewpoint on capital goods, see Page 44.)

6. Stable prices over the last two years mean that there will be no need to correct inflationary trends.

7. Consumer spending is still at high levels and probably will continue to put a floor under the economy.

8. In addition, consumers did not overbuy during the last uptrend as they did in 1957.

9. Some uncertainty has been attributed to the coming Presidential election. After Nov. 8, some of it will vanish and bolster confidence.

10. Intense competition will force

industry to spend for automation and modernization.

11. The recessions in housing and steel have nearly run their course and should be plus factors (or at the worst neutral) in coming months.

12. Some observers look for a tax cut early in 1960 to help stimulate business.

• **Consumer Still Key**—Regardless of how those factors shape up, the panel puts the consumer on the spot as the key element in the upturn. As one of the more optimistic members declares: "There is not much of a case for expansion in 1961; neither are we threatened on the downside unless consumers take fright and bring on the rainy day by saving for it . . . The discretionary factor in income use is the key element now."

If the economists are correct, a large part of that discretionary income will go into houses again in 1961. All but seven of the respondents see an upturn in new private housing starts, with the impact coming mostly in the second half of next year. It will take that long for recent money easing moves at the federal level to filter down to the consumer because business demand for plant and equipment spending is still fairly high. But over-all construction will not fare as well. The median (as many above as below) estimate of the panel for dollar volume of work put in place next year is up only 0.4 per cent. It is likely that a slight increase in costs will negate that rise, leaving physical volume at or below the 1960 level.

• **Other Estimates**—The economists are almost unanimously agreed that 1961 will not be as good a year for auto production as this one. The extremes run all the way from 4.7 million units up to 7 million, but the median is 5.9 million. They see production this quarter at about the 1.6 million unit level, somewhat below early scheduling by the automakers.

They also see a slight decline in steel output, down to 100 million tons in 1961 compared with 105 million this year. However, they feel that steelmaking will be a better indicator of economic conditions in the near future because production will be closely tied to consumption.

• **Equals**—On balance, 1961 should shape up about equal to 1960. The big difference will be in the direction of the economic trend lines. But don't get excited about a boom of the 1955-57 variety developing in another 12 months. "The recession may not be as sharp as the decline in 1958," comments Ira T. Ellis, economist for E. I. du Pont de Nemours & Co. Inc., "and the rise may not be as sharp either."

This is the second in a series of semiannual business forecast surveys. The members of STEEL's Panel of Economic Consultants will submit their estimates of future business conditions every spring and fall, the times when metalworking managers need this information most. The next survey will appear in the Apr. 3 issue of STEEL.

The editors present STEEL's Panel of Economic Consultants

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Miner H. Baker, vice president & economist, Seattle-First National Bank.
John J. Balles, vice president & economist, Mellon National Bank & Trust Co., Pittsburgh.
Edward S. Bigelow, economist, Minneapolis-Honeywell Regulator Co.
Ingersoll D. Bruner, economics research analyst, Carrier Corp.
Harold L. Buma, research economist, Bank of America.
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Edward L. Cushman, vice president, American Motors Corp.
James M. Dawson, vice president & economist, National City Bank of Cleveland.
Louis S. Drake, manager, economic research, Calumet & Hecla Inc.
David C. Elliot, vice president, Cleveland Trust Co.
Ira T. Ellis, economist, E. I. du Pont de Nemours & Co. Inc.
B. E. Etcheverry, director of general planning, Kaiser Steel Corp.
Richard W. Everett, assistant manager, sales control, Continental Can Co. Inc.
W. H. Finigan, director, marketing research, National Cash Register Co.
A. C. Fischer, regional market planning manager, Westinghouse Electric Corp.
William C. Flaherty, director, business research & market planning, Chrysler Corp.
Curry W. Gillmore, director of statistics & economics, International Business Machines Corp.
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C. C. Jamison, vice president & manager, Research Dept., Security First National Bank, Los Angeles.
Norris O. Johnson, vice president, First National City Bank of New York.
Lester S. Kellogg, director of economic research, Deere & Co.
Edmund R. King, assistant treasurer & chief statistician, Eastman Kodak Co.
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Herbert A. Leggett, vice president & economist, Valley National Bank, Phoenix, Ariz.
Harry Leopold Jr., director of commercial research, John A. Roebling's Sons Div., Colorado Fuel & Iron Corp.
Irving Lipkowitz, director of economic affairs, Reynolds Metals Co.
C. W. Mackay, manager, Business Research Dept., Anaconda Co.
Stanley V. Malcuit, staff economist, Aluminum Co. of America.
H. C. Micoleau, economist, financial staff, General Motors Corp.
James L. Rich, assistant director of commercial research, U. S. Steel Corp.
Nathaniel H. Rogg, director, Economics Department, National Association of Home Builders.
Arthur Rosenbaum, manager-economic research, Sears, Roebuck & Co.
W. E. Rothfelder, manager, Commercial Research Div., Inland Steel Co.
Arthur A. Smith, vice president & economist, First National Bank, Dallas.
A. Howard Smith, manager, Commercial Research Dept., Jeffrey Mfg. Co.
Beryl W. Sprinkel, economist, Harris Trust & Savings Bank, Chicago.
Benjamin F. Stacey, vice president, First National Bank of Boston.
Robert W. Storer, vice president, Manufacturers National Bank of Detroit.
Dr. Murray L. Weidenbaum, economist, Boeing Airplane Co.
David L. Williams, economist, Cleveland Twist Drill Co.

Containerization Is

Utility Trailer Mfg. Co.

Freight Container Production
(Units)

1958	2,000*
1959	3,120
1960	3,650*

*Estimate.

CONTAINERIZATION — moving materials in shipping containers—is making steady gains (see table above). About nine companies make such containers; their sales in the first half were close to $4.5 million.

Containers facilitate the shipping of packaged freight which can be readily consolidated into one container load and handled in a single lift rather than being loaded package by package into vans or cargo nets for subsequent restorage.

• **Benefits**—Containerized shipping is adaptable to a wide variety of packaged materials, as well as solid, crushed, powdered, or liquid materials in bulk—including refrigerated products. Advantages: Reduced handling, packaging, and transportation costs, less cargo damage and pilferage, quicker unloading and turnaround time for transport equipment, speedup of terminal operations, faster door-to-door service for shippers and consignees, simplified bill of lading procedures, greater flexibility of interchange, reduced insurance premiums, low cost temporary storage, and convenient storage of empty containers by stacking.

Containers also cut down excess dunnage, affording weight reduction and increased payload. A large appliance manufacturer says those factors lead to savings up to $11 per unit. Another firm reports elimination of pilferage saves 10 per cent of cargo value. Because the probability of pilferage is reduced, an insurance firm estimates premium savings up to 90 per cent.

• **How They're Made**—An average 35 ft container uses 4000 to 5000 lb of metal. Although containers vary with customer specifications, they are predominantly steel framed with aluminum skin. Corner posts and flooring are frequently rolled steel. Corners are steel castings.

Aluminum crossmembers are sometimes used. Some plastics have desirable properties, but the materials still present some problems in manufacturing standards. Numerous types of insulating materials are used in refrigerated units.

Containers range from pallet size (as small as 2½ ft x 3 ft in base area) to demountable truck types (as large as 40 x 8 x 8½ ft). Over the last few years, the marine industry has been the leader in container usage.

• **Problem** — The Truck-Trailer Manufacturers Association Inc., Washington, has taken a big interest in containerization. At its summer meeting, a panel pointed out a roadblock: No standardization. All systems are "captive" and do not interchange containers with one an-

Catching On

other. The American Standards Association recently set up tentative standards of 10, 20, 30, and 40 ft lengths and 8 ft width and height. The recommendations have been submitted to some 60 member organizations for action. Advocates feel that within five years of standardization, the growth of containerization may parallel that of piggybacking.

• **Effect on Tariffs**—Indications are that containerization will tend to bring tariffs down to the all commodity rate.

• **Many Applications**—Clark Equipment Co. uses containers of its own design to transport metal stampings from Buchanan, Mich., to Battle Creek, Mich. The components are loaded into the containers and lifted by material handling units onto highway vehicles and hauled to Battle Creek. The containers are removed by fork lift trucks and stand as placed until emptied, thus serving as temporary stockrooms.

Fruehauf Trailer Co., Detroit, has developed dual purpose containers and transporters for the Army's Redstone missile system and a special multipurpose container for ground handling Titan missile engines.

• **Plans In Gear**—On Aug. 10, the United States Freight Co. initiated a 3½ day transcontinental piggyback service which it hopes to develop into an intercontinental freight system using containers. New York to Los Angeles schedules have heretofore provided fifth morning delivery.

The service will utilize 40 ft containers adaptable to rail flatcars, highway trailers, or ocean vessels. The company says that cargo for overseas shipment will be loaded into the containers at the point of origin and moved by a combination of transportation methods to the overseas destination on one bill of lading.

In late August, the New York Central System began a supervan—trains carrying vans as containers between Boston, Worcester, Mass., Springfield, Mass., and Chicago. The railroad believes the service will provide the fastest freight schedule ever made between Boston and Chicago. Trains are scheduled so that the vans can unload from their special flatcars onto their highway wheels for fast predawn delivery.

Stainless Sales to Rise 87% By 1967 (vs. 1957), Says Inco

STAINLESS STEEL sales in the U. S. will reach 1,112,000 tons by 1967. That's 87 per cent above 1957 sales and four times the 1947 total.

• **Inco Study**—The projection was released last week by International Nickel Co. as the first part of a comprehensive study of the 20 major stainless steel markets.

Other forecasts for 1967: Carbon steel sales of about 96,585,000 tons, a gain of 38 per cent over the 1957 mark; total alloy steel sales of 7,280,000 tons, up 61 per cent from 1957's.

• **Service Center Target**—The market study is tailored to help service centers increase their stainless sales. Stainless is the biggest market for nickel, and service centers booked 41 per cent of all stainless shipments last year. Inco officials point out that while stainless steels accounted for only 1.42 per cent of total service center sales in 1959, they contributed 7.89 per cent to dollar volume.

The Inco study is broken down into 20 reports on the major stainless steel markets. Shipments are listed by countries. For instance, Inco's first report, which is on the appliance, utensil, and cutlery markets, reveals that makers of these products in York County, Pa., consumed 268 tons of stainless steel in 1957 and should require 588 tons in 1967.

• **Doubles in Decade** — Demand from appliance, utensil, and cutlery makers will nearly double in the 1957-1967 decade (to 77,000 tons), reports Inco.

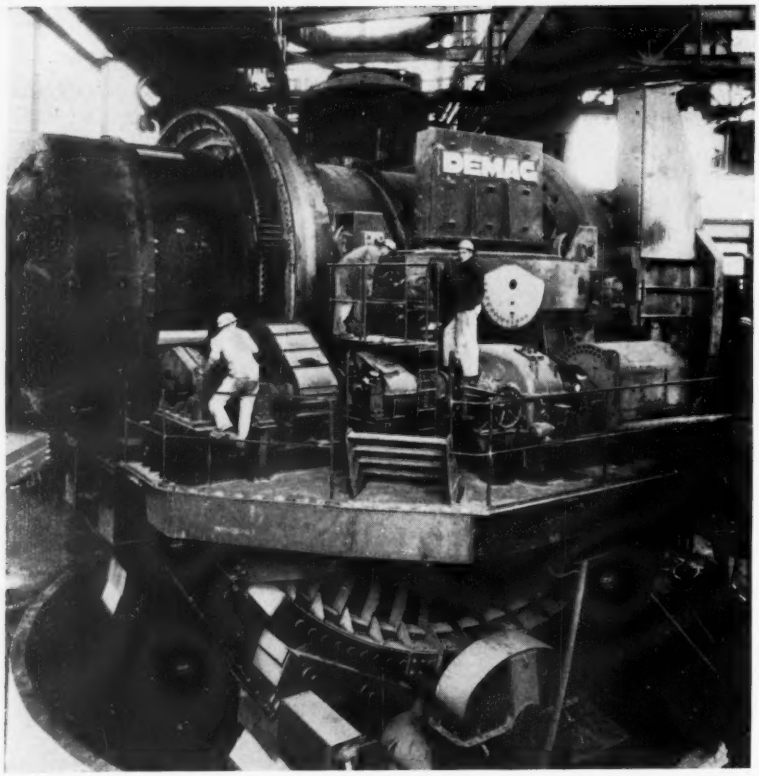
In addition to stainless, those industries should be using about 20,000 tons of alloy steel and more than 2.2 million tons of carbon steel by 1967.

• **Study No. 2**—The second of the Inco studies estimates that the food processing equipment industry can be a market for 43,000 tons of stainless by 1967 if the metal is aggressively promoted. That's more than double the 20,054 tons shipped to the industry in 1957. In addition, says Inco, food processing should require 7600 tons of alloy steel and 160,000 tons of carbon steel by 1967.

• **More to Come**—Over the next few months Inco will release 18 more markets studies: Automotive; agricultural; construction and contractors' products; hand tools; other domestic and commercial equipment; construction and related equipment; general purpose industrial equipment; mining, quarrying and lumbering; metalworking equipment; oil and gas drilling; other special industrial equipment; rail transportation; electrical machinery and equipment; pulp and paper equipment; chemical industry equipment; textile equipment; shipbuilding and marine equipment; and aircraft.

• **Can Do Even Better**—There's no reason why the forecasts can't be exceeded, believes Inco, particularly if more emphasis is placed in three areas:

• Aggressive development and marketing to recapture markets and to create new applications for stainless.
• Ingenuity in design and fabricating methods to reduce costs and open new fields of application.
• Aggressive and soundly planned promotion.



The Demag "rotor" furnace, a cylindrical unit that rotates on its longitudinal axis, is one of the oxygen steelmaking advances that attracted considerable attention at the Iron & Steel Exposition last week, where a detailed model was shown

Mill Equipment Outlook: Up

IF OPTIMISM and enthusiasm are the keys to sales success, equipment makers supplying the steel industry are about to unlock a capital spending upturn. (For another view, see Page 39.)

At the Iron & Steel Exposition in Cleveland last week, equipment makers contacted by STEEL said they thought the low point in steel mill buying had been reached. Most believe that the cutbacks in capital appropriations have been completed and that some of the abandoned modernization programs will be reinstated next year. The builders' optimism stems from numerous reports that inquiries have picked up.

The builders are enthusiastic about the wide range of new products they introduced at the Cleveland show. So they are nearly unanimous in predicting that 1961 orders will exceed those of 1960. And they look for the upturn to begin —slowly—in this year's fourth quarter. Witness these comments:

• "We are programing our 1961 sales about 4 per cent above those of 1960. We think the low point was hit in July and August; sales will rise in the last quarter and a bigger increase can be expected in the second half of 1961"—H. B. Cummings, vice president and general manager, Metal Products Div., Koppers Co.

• "The first six months of '61 will be better than the first half of this year"—F. W. Dohring, vice president-sales, Elliott Co.

• "Business will be generally better the rest of this year and into 1961 for makers of instrumentation and quality control equipment"—A. K. Saltes, Pittsburgh sales manager, Magnaflux Corp.

• "Next year's sales will be as good as this year's"—W. A. Branic, sales manager, Electric Rider Truck Div., Automatic Transportation Co.

• "We expect the steel industry to make large expenditures in 1961 to meet the tough competition they face from the U. S. and abroad"—R. G. Gaw, manager-steel industry sales, Western Div., Joy Mfg. Co.

• "Our 1960 sales have been much better than last year's, and our outlook for '61 is good, especially in oxygen converter applications"—J. F. Hornor, market manager-steel industry, Minneapolis - Honeywell Regulator Co.

• "We expect a sales increase next year over this year—and this was a record year for us"—Norman Davies, president, North American Mfg. Co.

• "New products will be the major influence in pulling our 1961 sales ahead of this year's"—D. S. Myers, steel mill sales, Selas Corp. of America.

• "If we were dependent only on 1959 items, next year wouldn't look good to us. But we expect it to be as good or better than this year due to our new products"—Philip J. Berg, sales manager, Engineering & Construction Dept., Dravo Corp.

Observers could easily see why the sales executives were emphasizing new products. Equipment makers displayed numerous technical advances designed to reduce steelmaking costs. Automation and instrumentation were the bywords. General Electric Co., for example, showed a process control computer to operate a six stand mill. Leeds & Northrup Co. exhibited analyzing equipment to measure carbon monoxide, carbon dioxide, and hydrogen in blast furnace top gas, recording the analysis on one chart.

Direct reduction earned considerable interest from the steelmen. McDowell Co. announced a process, called the Dwight-Lloyd McWane, for making low cost iron with low grade materials (see Page 45). M. W. Kellogg Co., licensing agent for the Hojalata y Lamina process, says a 500-ton-a-day plant is on stream in Mexico.

Metal Show, Oct. 17-21

American Society for Metal's Exposition & Congress will be held at the Trade & Convention Center, Philadelphia, Oct. 17-21.

Direct Reduction Process Unveiled

A PROCESS that bypasses the blast furnace and allows low volume users to produce iron economically has been introducerd by McDowell Co. Inc., Cleveland. Called the Dwight-Lloyd McWane process, it is said to produce low cost iron and to require modest capital investment.

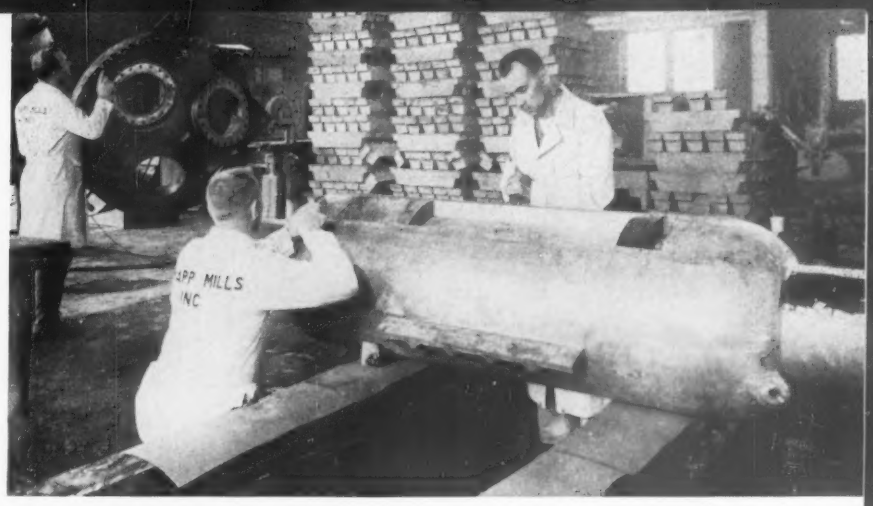
The process combines a sintering machine and electric furnace with optional grinding and pelletizing equipment. It is expected to be extremely useful to companies that require about 500 tons of iron a day, but it can be scaled up economically for higher capacities, says McDowell.

• **Economical**—Inexpensive raw materials—ore and limestone screenings, and noncoking quality coal—are used in the process. Fine ore is mixed with coal fines and limestone, pelletized, and fed into the sintering machine, where it is partially reduced. The self-fluxing, self-reducing pellets from the sintering machine are charged into the smothered arc, electric furnace at about 1500° F for final smelting.

Studies in the company's demonstration plant indicate that a single unit (500 tons a day) will cost "$6 million to $7 million," says Robert C. McDowell, president. "That represents a capital cost of $35 to $45 per net ton of annual capacity vs. about $90 per net ton for a modern blast furnace and coke plant."

• **"Has Logical Place"**—"We don't expect D-LM to replace the blast furnace," says Mr. McDowell, "but we expect it to have a logical place in the metal producing and consuming industries because of its ability to produce high grade iron economically from low grade raw materials."

Production costs for the process will depend on the cost of electric power and the delivered costs of iron ore, coal, and limestone. Pilot plant studies show that iron can be produced for about $47 per ton in the Lake Erie region, where electric power costs about 8 mills per kilowatt hour. In the St. Lawrence River area, where power is available at a lower rate, iron could be made for less than $39 per net ton.



This is a demineralizer for nuclear ships, made from Nicrolum by Knapp Mills

Knapp Develops 'Insmetals'

A FAMILY of constructional metals that is said to have superior radiation shielding and corrosion resistant properties in nuclear and chemical processing applications has been introduced to the commercial market by Knapp Mills Inc., Long Island City, N. Y.

Under development for 14 years, the Insmetals (short for International Shielding Metals) shield against the escape of gamma radiation and attacks of corrosives and also resist radioactive corrosion, says Knapp Mills.

• **Bonding Process** — Properties of the Insmetals center on the metallurgical bonding of lead to other metals. They are:

- Bauxilum: A combination of lead and aluminum.
- Cupralum: Lead plus copper.
- Ferrolum: Lead plus carbon steel.
- Ferro-Nicrolum: Lead plus stainless clad steel.
- Nicrolum: Lead plus stainless steel.
- Inslead: Pure lead "improved by certain new directional shrink cooling techniques which assure full density."

Alfred P. Knapp, chairman, says designers and engineers can utilize lead's corrosion and gamma shielding value plus the selected additional advantages inherent in other metals. Mr. Knapp cites a few: The strength of steel, the electrical conductivity and heat transfer value of copper or aluminum, and the corrosion resistance and ease of decontamination (via radioactive residues) of stainless steel.

Thicknesses of the lead surface can range from 0.125 in. to more than a foot.

• **Range of Products**—During the development period, a range of prototype products using some 50,000 tons of Insmetals have been made for the nuclear and chemical processing industries. Included are shielding for nuclear vessels, insect and plant irradiators, storage tanks, shipping containers and tank cars, heating and cooling coils, heat exchangers, pipe, valves and fittings, plating anodes, and many types of chemical process vessels.

Within a short time, the commercial market for Insmetals will reach an annual rate of 10,000 tons, believes Mr. Knapp.

• **Cost Competitive**—The cost of Insmetals is no higher and in many cases is lower than that of competing materials, says Mr. Knapp.

The Insmetals will be processed and distributed by four producer-builders in the U. S. and six in other countries. The companies will make and sell the metal, and fabricate parts and assemblies for customers.

In some cases it will also sublicense other companies to produce Insmetals.

Commerce's Export Program Begins to Help ... B-70 Project Still Up in the Air ... Russian Mineral Strength Gains

● **REPORT ON OPERATION HARD SELL**—Our export expansion program is catching on. Termed Operation Hard Sell by the Commerce Department, it's designed to correct the $3 billion deficit in our balance of payments forecast for 1960. The deficit was $3.8 billion in 1959 and $3.6 billion in 1958.

If we can continue to export in the second half as we did in the first, Bradley Fisk, assistant secretary of Commerce for international affairs, believes exports will climb to $19.5 billion for the year vs. $16.3 billion last year. Imports are coming in at an annual rate of $15.5 billion, a 6 per cent increase over the 1959 pace.

Commerce offers these seven points as guides to participation in its program:

1. Contact your Commerce Department Regional Export Promotion Committee. The 33 groups (addresses available from your local Commerce office) are composed of businessmen with export knowhow.

2. Read *Foreign Commerce Weekly* for trade tips. A subscription is $6 a year.

3. Check state development groups and trade associations. Many plan export programs which include workshops and seminars designed to help the novice.

4. Use foreign service officer newsletters. They're circulated in Quito, Ecuador; Marseilles, France; Kuwait, Arabia; Kuala Lumpur, Malaya; Dacca, Pakistan; Bagdad, Iraq; Canberra, Australia; Wellington, New Zealand; Istanbul, Turkey; Cairo, Egypt; and Rangoon, Burma. They describe U. S. products which might appeal to those areas. To get your product circularized, contact the embassy involved.

5. Check your commercial bank on export-import bank guarantees. From May 23 to Sept. 8, the Export-Import Bank issued 82 short term insurance contracts covering exports valued at $57 million. Of the 145 commercial banks in the U. S. authorized to handle the program, 29 have participated so far.

6. Interview businessmen returning from foreign trade missions. More than 200 have served since 1954. Missions in fiscal 1961 are planned to Afghanistan, Iran, France, East Africa, the Federation of the West Indies, Ceylon, Malaya, Singapore, Colombia, Australia, Japan, West Germany, Chile, Uruguay, Congo, Nigeria, and possibly Iraq or the United Arab Republic.

7. Participate in trade shows. Some of the trade missions involve trade fairs. A complete listing is available from your Commerce office.

● **B-70 PROGRAM STILL UP IN AIR**—The Defense Department is ready to apportion the extra $100 million O.K.'d by President Eisenhower for the B-70 Bomber program, but much doubt remains about how fast the program will be speeded up or how large it will be in terms of the number of aircraft produced. The President originally asked for $75 million in fiscal 1961 to keep the prototype program going. It meant that all subsystems needed to make the craft a military weapon were out. Now the $100 million will be spent on subsystem development to have a prototype weapon system available when the basic plane is ready around 1965-66. Congress wanted $184 million extra spent this fiscal year to get the plane back on its old schedule, but Ike decided against it because he's not convinced that we need another bomber. The $84 million left in the account after $100 million is apportioned could be available immediately to the Air Force if a new administration sees the B-70 in a different light.

● **KAISER STEEL ANSWERS FTC**—Kaiser Steel Corp., Oakland, Calif., denies the Federal Trade Commission charge that its acquisition of a substantial portion of the voting stock of Allison Steel Mfg. Co., Phoenix, Ariz., violates Section 7 of the Clayton Act. Kaiser reports that it bought about 45 per cent of the Allison voting stock in 1948 for more than $1 million but that the deal was "purely an investment." Kaiser asks dismissal of the complaint.

● **FEDERAL BUDGET UP AGAIN IN FISCAL '62**—Maurice H. Stans, Bureau of the Budget director, warns that built-in increases in the federal budget mean a $1 billion increase in fiscal 1962. Built-in increases caused a $2 billion hike from fiscal '60 to fiscal '61. He notes that the President thought he would have a $4 billion surplus in fiscal '61 but charges that by the time Congress finished, "the surplus had almost melted away under the hot sun of an election year."

● **RUSSIAN MINERAL STRENGTH GAINS**—The Interior Department says the USSR's exports of minerals were up 14 per cent in 1959 vs. 1958's and twice their 1955 value. Imports were less than 7 per cent higher than 1958's. Zinc, tin, and aluminum exports to the Free World were down, while fuels, iron ore, pig iron, rolled steel, manganese ore, chromite, and asbestos shipments were up.

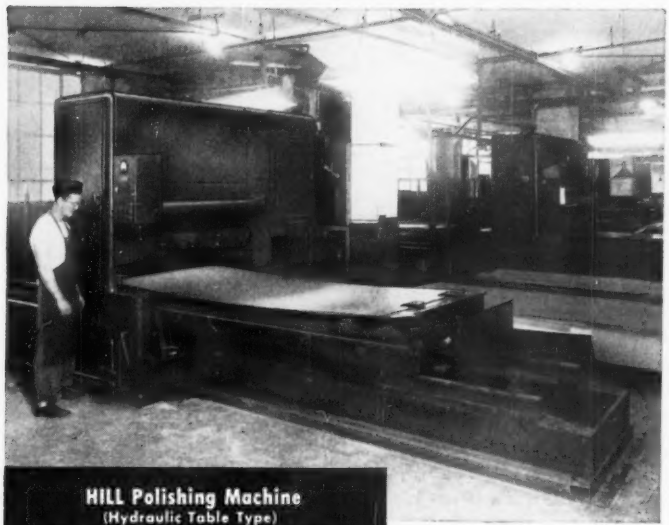
● **CAPITOL NOTES**—Corporate tax collections were $22.2 billion in fiscal '60 vs. $18.1 billion in fiscal 1959 . . . The Navy's Project Suric (surface ship integrated control) has gone to Sperry Rand Corp. It will prove the feasibility of operating ships with fewer men by utilizing more automated machinery.

HILL GRINDING AND POLISHING MACHINES

For FINISHING

Any and All

FERROUS and NON-FERROUS MATERIALS . . .



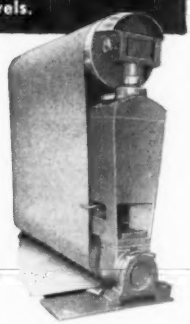
HILL Polishing Machine
(Hydraulic Table Type)
For polishing individual sheets and plates. Hydraulic reciprocating table with centralized controls.

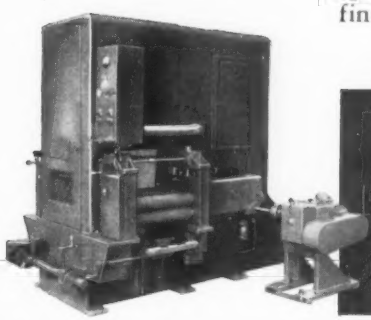
FLAT surfaces of ferrous or non-ferrous material can be brought quickly to the high finish so necessary for today's industrial and consumer products. The dairy, automotive, home appliance and engraving industries are typical of the wide range of application for these precise, labor saving machines.

HILL abrasive belt grinding and polishing machines are built in two general types. The hydraulic reciprocating table type polished individual sheets and plates. Table widths vary from 36″ to 60″. Table lengths range from 60″ to 240″. The Pinch-Roll type is for progressive line polishing. The HILL two-roll vertical head with endless abrasive belt is the basic principle common to both types.

When writing for information please indicate size and specifications of stock to be finished.

The basic HILL two-roll vertical head with upper steel idler roll and lower rubber covered contact or work roll (both dynamically balanced) over which the endless abrasive belt travels.





HILL Grinding and Polishing Machine
(Pinch-roll Type)
For pre-finishing, conditioning and polishing. Used as single units or in multiple units for progressive line polishing in wet or dry operations.

HILL ACME TOOLS FOR INDUSTRY

THE HILL ACME COMPANY

HILL DIVISION
ESTABLISHED 1882
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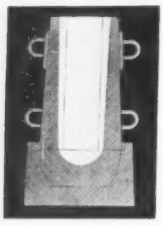

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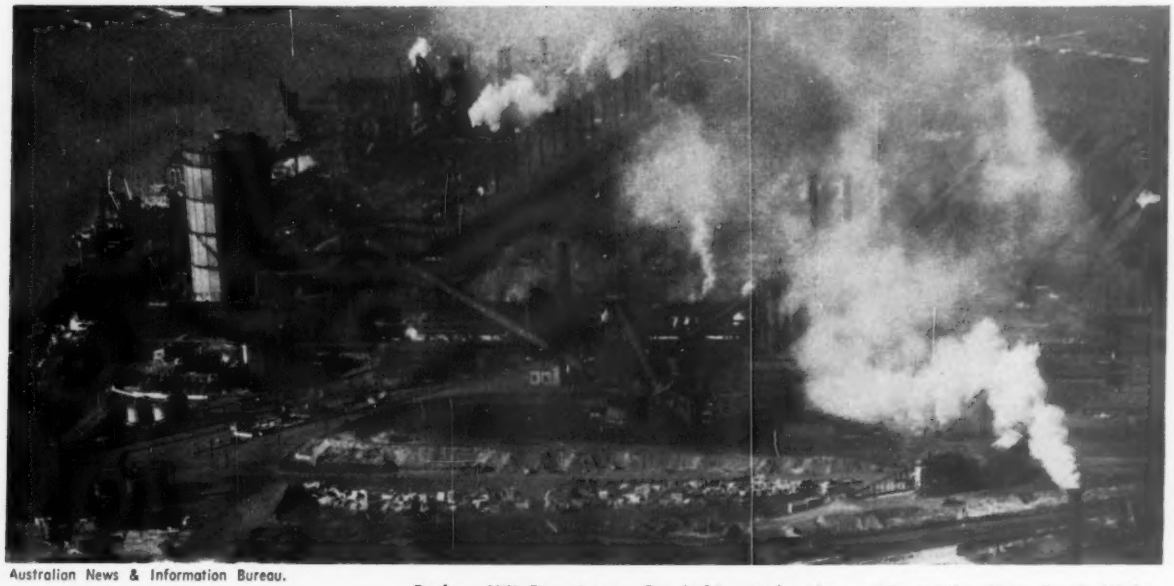


Australian News & Information Bureau.

Broken Hill Proprietary Co. Ltd.'s steelworks at Newcastle, New South Wales

Aussie Steel Nears Self-Sufficiency

AUSTRALIA is on its way toward balancing its steel production and needs. Production is presently about 3.5 million tons annually, should reach 4 million by 1961, and 6 million to 7 million by 1970. In fact, the island continent is expected to become a net exporter of steel by the mid-'60s.

Evidence of Australia's growing self-sufficiency: U. S. shipments of steel have plummeted from 53,000 tons in 1955 to less than 6000 tons last year. And the 1959 U. S. strike can't be blamed for all of that loss, for shipments have steadily dwindled during the last five years. They totaled only 9000 tons in 1958.

• **Why the Growth?**—Australia (population: 10 million) has never had a ready supplier of steel. As a result, she's had to install local facilities to meet growing needs. Demand has been rising at an average rate of 6 per cent a year since World War II. Industrialization has been so rapid that domestic steel output has been inadequate to meet some peak needs.

Two plus factors for the industry have been its good supply of raw materials and the economically strategic location of its major works at Newcastle and Port Kembla in New South Wales.

• **Broken Hill Combine**—A closely associated group of companies under the central control of Broken Hill Proprietary Co. Ltd. produces most of Australia's iron and steel. BHP is a public corporation with 60,000 shareholders. It is linked with 16 proprietary companies, the largest of them, like BHP itself, concerned with the manufacture of iron and steel. The others work semifinished steel into finished products such as wire, produce special alloy steels, or have service functions for the main producing companies.

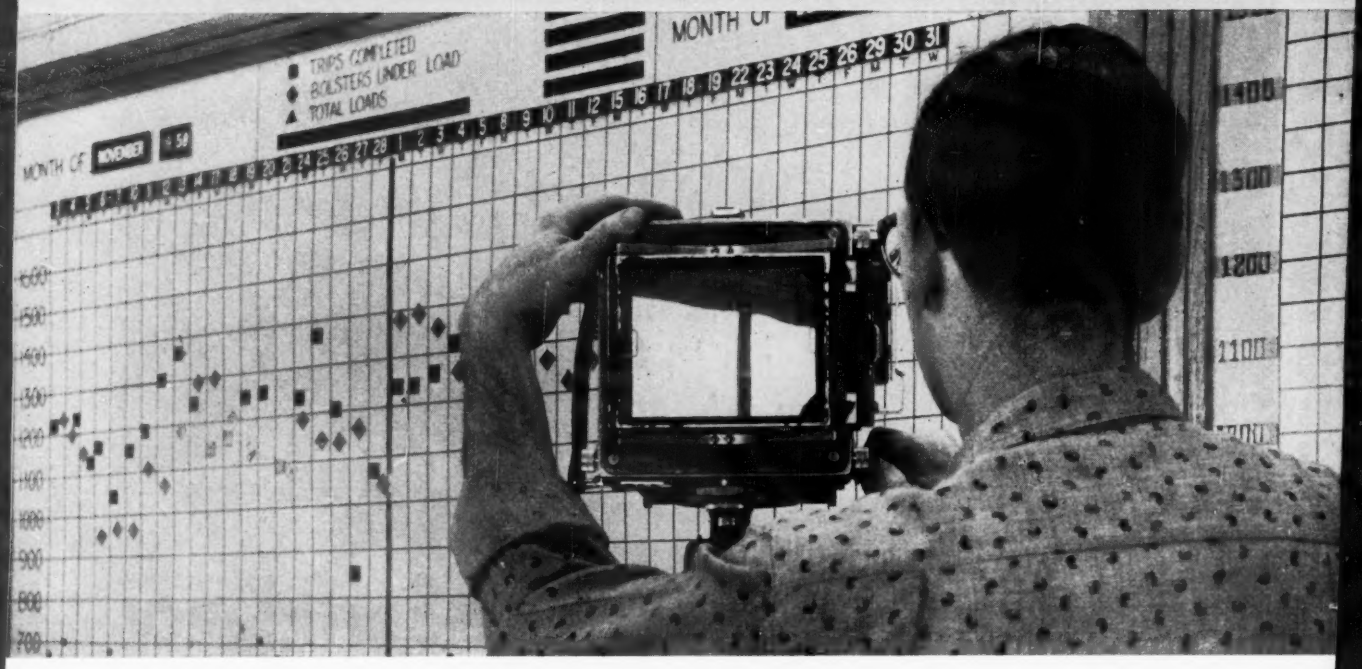
Broken Hill has pursued vertical integration and has encouraged the establishment of steel using companies in Australia, thus increasing sales opportunities for its own products. On occasion, it has taken over some of the steel finishing firms which had originally been set up as independent operations to preserve steel markets. That has been especially true in hard times and is one way by which the vast BHP combine came into existence.

For the last 30 years, BHP has been able to maintain its costs and pricing structure to compare favorably with overseas producers. Tariff protection for most of the company's products has not been necessary.

• **Modern Facilities**—The steel industry in Australia is reportedly as efficient and technically advanced as any in the world. BHP is continually pushing a program of plant modernization and expansion. In recent years, the firm and its subsidiaries have invested an average of $56 million a year in capital works.

Technologically, the BHP combine has kept closely in step with U. S. practice. That is probably due to the similarity of raw materials and the association of key personnel brought in from the U. S. with the Newcastle steelworks during its early days. As a result, the industry has relied on the open hearth furnace for making steel. However, the oxygen process is making much headway. Australians have also preferred a few large steelmaking units to several small operations.

15 Ways Photography Pays Off



RECORD KEEPING—At Timken Roller Bearing Co., wall charts are photographed, and an 8x10 print becomes the firm's permanent record

YOU CAN trim costs, save time, boost quality, close sales, speed research, and bolster employee relations through the intelligent use of photography. And, in most cases, you don't have to hire a professional. Take tips from these examples in metalworking. . .

• **Plant Layout**—When Thompson Ramo Wooldridge Inc. moved its U-Flex piston ring production facilities to St. Louis from Cleveland, photography was the key to a fast startup. The firm had an overhead diagram of plant layout on grid film and shots of the work center layout. It also made a movie showing work flow, job specifics, and production standards at each job location. Result: Engineers at St. Louis got the new production line humming with equipment they had never before seen.

• **Progress Reports**—General Electric Co. uses movies—many in color—as progress reports on government projects. The movies are written, directed, produced, and filmed by GE staff members. They use such techniques as animation, stop motion, studio sets, and on-site shots. Says Charles H. Ely, manager of GE's photographic unit in Syracuse, N. Y.: "To the key military personnel for whom the progress report is designed, it represents the best—and, in many cases, only—way they can be 'clued in' on a project of such tremendous scope."

Timken Roller Bearing Co., Canton, Ohio, uses photos as a before-and-after record of work systems.

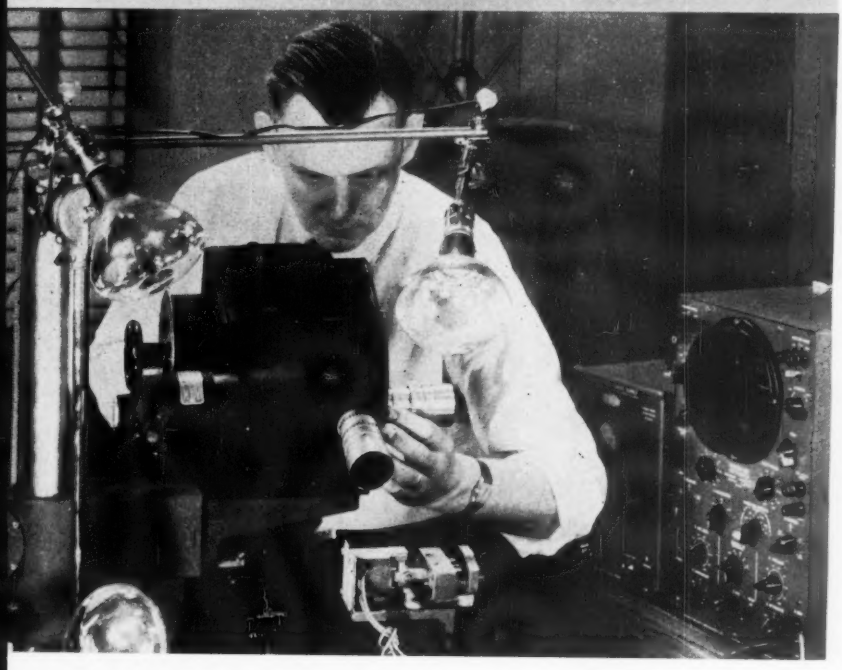
Reynolds, Smith & Hills, Florida architectural and engineering firm, uses photos to keep management, engineers, designers, and draftsmen posted on contractors' progress.

• **Packaging**—Overseas Packing & Processing Co., Cleveland, builds crates to special order for overseas shipment of machinery. Many of the containers require special design work. To guard against repeating the same design work at some future date, the company takes photos of each step in the construction of special crates, and keeps the photos on file.

• **Equipment Failure** — Drayer-Hanson Div. (Los Angeles) of Natus Corp. used high speed photography to discover why a press jammed at 135 strokes a minute. Using a 16mm, Kodak movie camera with a 6 in. Telephoto lens, the operation of the press was captured on film at 64 frames per second. Projected at 16 frames a second, the movie showed that the tripper spring action of the press caused the tripper plates to bounce occasionally—and jam. Engineers redesigned the spring. Total cost of film and processing: Only $20.

• **Marketing**—Kellam & Foley, Co-

RESEARCH—Kodak high speed camera records the mechanical operation of a relay and superimposes the oscillograph traces from the screen shown on the right of the mechanical image



lumbus, Ohio, uses color slides to show design ideas to clients. Tractor & Farm Supplies Inc. provides its dealers with movies showing farm equipment in use. A business machine maker uses movies to give customers a graphic demonstration of equipment advantages. The machines are too bulky to cart around the country. Some customers have placed orders immediately after seeing the movie.

• **Product Evaluation** — North American Aviation Inc. uses color prints to chart metal test results. It will subject a metal to different temperatures for various periods. At the end of each test, the metal section is photographed in color to supply engineers with a permanent test record.

Thompson Ramo credits photography with an assist in the development of a new automotive product: A valve rotator to replace the conventional cap in a hydraulic, automatic valve assembly. The principle was to rotate the valve slightly each time it was lifted. Engineers couldn't check the timing with the naked eye—engine speed was nearly 3000 rpm. Product Engineer Jack Grisby recorded the action on a high speed camera at 3000 frames per second, then projected the film at normal speeds to quickly determine needed adjustments.

Gardner-Denver Co., Grand Haven, Mich., uses movies to test its high speed air tools. J. L. Meyers, research supervisor, says: "We're now able to pinpoint problem conditions that we could only guess at before." Example: A hole was cut in the housing of an impact wrench and markings made on the internal structure with 10 degree graduations to define the amount of rebound that would occur. A synchronous motor to drive a dial calibrated to 1/18,000 of a minute was hooked up to time strokes per second. "We had to detect the action with strobe light and used dyes to locate points of impact," says Mr. Meyers. "The high speed movies solved an axial problem we could not detect by any other method." The firm paid for its motion picture equipment with the time saved on its first project.

• **Training**—Timken takes color photos of steel defects, uses them to instruct student inspectors.

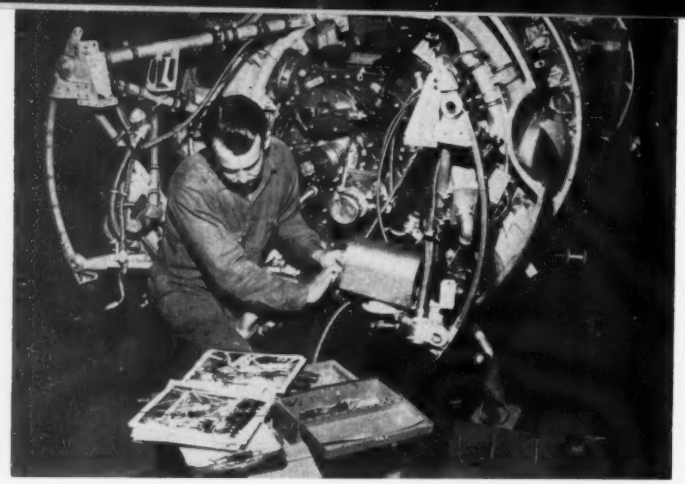
The Nickel Plate Road makes use of photography in safety education. Slide presentations illustrate unsafe job practices. The carrier poses its scenes and shoots them with a Kodak Retina IIIC, 35 mm camera. The company has 300 Kodak slide projectors and a like number of slide sets filed in key cities in its system. Says R. C. Sabens, superintendent of safety: "Slide presentations allow us to reach all of our employees . . . wherever there's an electrical outlet—from air-conditioned offices to track-side shanties."

Thompson Ramo's Tapco Group used a movie to impress employees that vanes and blades for jet engines demand delicate handling. The movie showed all operations and how handling could cause a reject at any point. It even illustrated how a part could be ruined by merely breathing on it.

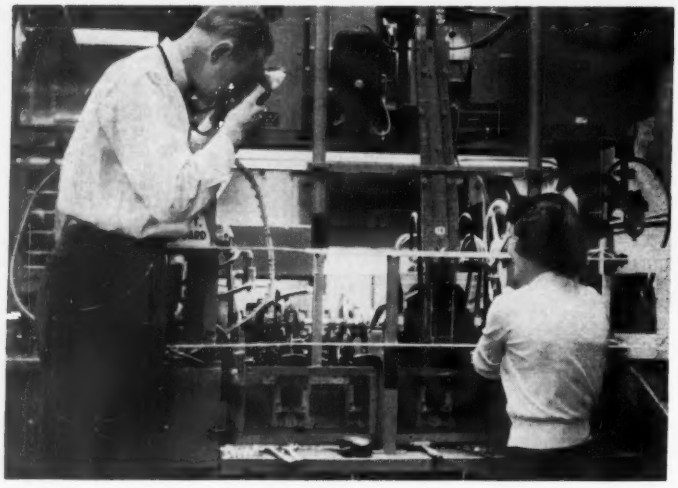
Thompson Ramo boosted worker efficiency by 15 per cent in a warehouse by showing a movie of performance in another warehouse.

• **Work Loading** — At Thompson Ramo, studies showed that individual workers were performing at peak efficiency, but the line was below par. A time-lapse movie camera, situated to command a full view of the line, made an exposure a second until 30,000 frames were taken. The entire day's work flow was studied in 30 minutes the next day. Work loading proved to be the production barrier. Shifts were made and output jumped 20 per cent.

• **Preventive Maintenance** — The Louisville & Nashville Railroad uses photography to study its 700 locomotives before they break down. The photos help to set guides for



MAINTENANCE—An aircraft engineer uses photographs as a guide in making engine repairs in the field



EMPLOYEE TRAINING—An industrial engineer shoots a production operation. Photos will be used in training new employees for the job

proper maintenance of new equipment, supply evidence to review the causes of breakdowns, and eliminate potential trouble with materials to be purchased in the future.

• **Sales Communication**—GE's Apparatus Sales Div. keeps its hundreds of sales engineers posted on new products and developments via 16 mm sound newsreels.

• **Research**—Timken used film to study railroad trucks at the moment of impact when cars were switched. A 16 mm movie camera and four banks of four rack, 125 candlepower, photo reflector spots were mounted beside the track, and the trucks were photographed to show the nature and degree of thrusts and stresses. It helped the company improve bearing design. Timken also used high speed photography to track down the causes of loose drive wheels on locomotives. Timken's roller bearings were suspect when driver wheels became loose, but the photographs showed the real cause to be improper counterweighting.

Timken also used color photography to study gear contact under varying loads—and to check the load zone on bearing races.

Gardner-Denver takes photos of images on an oscillograph screen (with Kodak Plus-X film). Objective: Develop compressors with faster speeds and reciprocative pressures. The setup gives the firm a true pressure-volume indicator card, providing the relationship of pressure to piston displacement. Using measuring devices, the firm gets a photo with horizontal images (representing volume) and vertical images (representing pressure). A camera with a Polaroid back is used for rush studies.

• **Customer Service**—Hughes Tool Co., Houston, drillmaker, uses high speed photography to improve customer service. When a customer has a drilling problem, a sample of the rock is sent to Hughes's engineering office. The firm takes high speed movies of various bits working through the sample. Taken at more than 3000 frames per second, the movies are projected at slow speeds, permitting engineers to select the best bit for the job.

A Thompson Ramo engineer used a movie camera to obtain an important nuclear powerplant research contract. He made a photographic record of his company's people, processes, and facilities. The filmed presentation was the deciding factor in landing the contract.

The same engineer, near a deadline for a progress report to a top customer, took a 16 mm movie of critical setups and sequence records of work in progress. The customer was highly pleased with the unusual report—which was made before the deadline.

• **Material Handling** — Timken's Steel & Tube Div. photographs wall charts for simple record keeping. The division's material handling system is based on open air storage, free movement of materials, and a minimum of paperwork. Straddle carriers and lift trucks are dispatched by radio and telephone. Two wall charts are used to schedule the vehicles. One shows the loads moved, the loads on bolsters, and the loads on the ground, day by day for two month periods. This chart is photographed at the end of each period, and 8 x 10 prints are made and filed. The other chart is used to keep track of the lift trucks. This chart is photographed weekly. Prints of the charts give exact records of usage, requirements, and the causes of bottlenecks.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

Two separate coal regions—the Eastern Kentucky field and, 200 miles away, the Western Kentucky field—produce great quantities of high-grade bituminous coal.

Bituminous COAL Attracts Industry to KENTUCKY

KENTUCKY'S tremendous deposits of high-grade bituminous coal are an important reason why *great things are happening in Kentucky* . . . why Kentucky industry is growing 55% faster than the national average.

Kentucky is the *third-largest bituminous coal-producing state*—the only state with *two* widely-separated fields. There are plenty of reserves, too. Actually, less than 4% of the total estimated deposits of high-volatile bituminous coal in Kentucky have been depleted.

Coal provides many important advantages for Kentucky industry. Abundance of coal, plus great supplies of water,, have brought a tremendous concentration of electric power capacity to Kentucky. In fact, sufficient reserves of power are readily available to supply any new or expanding industry. And industry has found that Kentucky coal is unexcelled for coking, and for the 2,000 or more by-products derived from coal.

Combine these factors with Kentucky's other natural resources, its favorable labor climate, its central location, its record number of financial plans for new and expanding industries . . . and you see why Kentucky is the nation's Number One industrial opportunity.

Let us give you all the facts. Just outline your needs, and we will send you a complete analysis of Kentucky's ability to fulfill them. Your inquiry will be held in confidence.

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Kentucky Department of Economic Development
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Allen-Bradley Standard Duty Push Buttons can be installed

in about half the time!

In accurately timed tests, Allen-Bradley standard duty push buttons required *about half the installation time*—on the average—than each of four other popular makes. This saving in installation time means "dollars" saved on the job.

How come only famous A-B standard duty push buttons possess this time and moneysaving advantage?

The answer lies in the molded, wrap-around cover—which also contains the contacts. When the cover is removed, the wiring terminals are *out in the open*—ready for wiring—and you have plenty of working space. The two cover screws are captive—they cannot fall out and get lost. And with the contacts in the cover, they are protected against accidental damage and careless wiring. Naturally, these push buttons have double break, silver contacts that never need service attention. There are two concentric knockouts on each end of the base, which are removed from the *outside*—the heavy, pressed steel base will not bend out of shape.

Your local A-B distributor has these Bulletin 800 push buttons *in stock*. Call him today—you'll save time and money on your next job.

**Using recognized standard duty push buttons, installations were made by an experienced electrician under identical conditions. He was not connected with Allen-Bradley Company in any manner.*

A-B STANDARD DUTY PUSH BUTTONS
Made as a one-, two-, or three-unit station—with pilot light available. Readily changed for horizontal or vertical mounting. Convertible two- or three-way selector switch supplied with or without pilot light.

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QUALITY MOTOR CONTROL

What UAW's Reuther Will Push for in '61

- Higher pay.
- Shorter workweek.
- Profit sharing plan.
- Pension trust control.
- Aid for displaced workers.
- Company paid health insurance.

Autodom Builds Bargaining Fact File

LOOK FOR the United Automobile Workers to start beating the drums for contract terms shortly after the first of the year.

Walter Reuther is quiet now, but he knows the low wage rates of foreign competitors will make it tough for the union to win big pay hikes. He'll start his propaganda early because he'd like to get at least a 10 cent annual package when major auto contracts expire Aug. 29, 1961. The UAW's prebargaining convention will open next spring.

Here are the major items that will come up in next year's negotiations.

Wants Higher Wage Rates

The union signed its lowest three year package in 1958 (24 cents minus escalation clauses). It is difficult to see it getting more this time, but inflation continues.

Automakers are already starting to gather ammunition. Suppliers say Ford is selecting parts now made in its U. S. captive plants and is asking for quotes on them from venders all over the world. Foreign labor costs on the parts are considerably lower than Ford's. The collection of quotations should make an impressive array of evidence at the bargaining table.

It isn't known how Ford plans to use the information, but in discussing the recent $1 million purchase of Falcon parts from Great Britain, Earl G. Ward, Ford's purchasing vice president, says: "We have purchased certain items overseas before and are doing so now to further our quality and cost comparisons on products from a variety of sources. Such comparisons are of particular importance at a time when rising material and labor costs confront U. S. manufacturers."

Wants to Share Wealth

One way or other, Mr. Reuther still wants a slice of the profits. This time he may strike for a division of savings resulting from automation. Precedent has been established by a West Coast Longshoremen's local: Automation savings are being funded and will later be distributed on an equitable basis. (Payoff methods still are being arbitrated).

Wage renegotiations might be another profit sharing pitch. Advances would be bargained for normally at the start of a new contract term but would be subject to periodic review under the "living document" theory. Profit margins at the end of each year (or at the end of the contract) automatically would subject the company to additional wage payments.

Still Fights Automation

Aid for workers displaced by automation will be a hot issue. It can be shown that productivity increases

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Look Alikes: The 1961 Oldsmobile 88 Holiday sedan and its compact cousin, the F-85 (right). Some compacts are widely divorced from their larger division relatives in styling, but Oldsmobile is fostering the idea that large or small, they are still Oldsmobiles. The Holiday 88 is built on 123 in. wheelbase, but it is 5 in. shorter than the '60

as a result of automation have been relatively small since 1955. Also, over a longer period, it does appear that more mechanization has eliminated jobs or at least shifted workers into other job areas—some of them outside UAW bargaining groups.

In 1951, for example, average hourly employment in the auto industry was 708,000 workers. That year it built 6.7 million cars and trucks, or 9.5 vehicles per man. Last year, the industry produced 6.7 million vehicles but employed only 573,000 hourly workers. Output per man was boosted to 11.7 units. It's likely that the UAW will ask for company paid training programs for displaced workers. Also look for automakers to grant further concessions in area seniority lists and transfer allowances. Hiring procedures and regulations concerning overtime probably will be revamped. Wider coverage for skilled pay differentials will be sought.

Pessimism about rising unemployment will provoke another swipe at the 32 hour week. The UAW will rant and rave. The companies will say "no" firmly, and this time they'll probably win. But pressure for the shorter week is growing (see STEEL, Sept. 26, p. 63). Unless a multi-industry cure can be found, some labor bargainers fear the short workweek will come within five years.

Won't Put Pensions on Shelf

UAW pension trust funds now total about $1.5 billion; payouts to pensioners (about 115,000) are running nearly $6 million a month. The union doesn't seem eager to change pension provisions, but Mr. Reuther still wants to have a say in administering the pension trust funds. He's expected to press again for union-management committees to oversee fund investment. As before, the union would like to see some of the pension money pumped into low cost housing projects in job depressed communities.

Other fringe benefits that will be brought up include health insurance and holidays. Since steel companies now pick up the tab for employee health insurance, the UAW will go after the same deal. Automakers now pay half, and they aren't apt to change their opinion that full payment smacks too much of socialistic paternalism. Still it's conceivable that one of the auto companies might introduce its own health insurance plan and dump Blue Cross.

It's also possible the union may ask for eight paid holidays although this has been unusual in UAW shops. One contract that changed Christmas Eve and Dec. 31 from half to full holidays was signed earlier this year at American Radiator & Standard Sanitary Corp.

U. S. Auto Output

Passenger Only	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
8 Mo. Totals	4,549,482	4,078,574
September		258,151
October		507,527
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
Aug. 27	38,952	18,335
Sept. 3	51,647	17,261
Sept. 10	52,635	24,364
Sept. 17	85,879	62,716
Sept. 24	117,250†	91,341
Oct. 1	130,000*	105,720

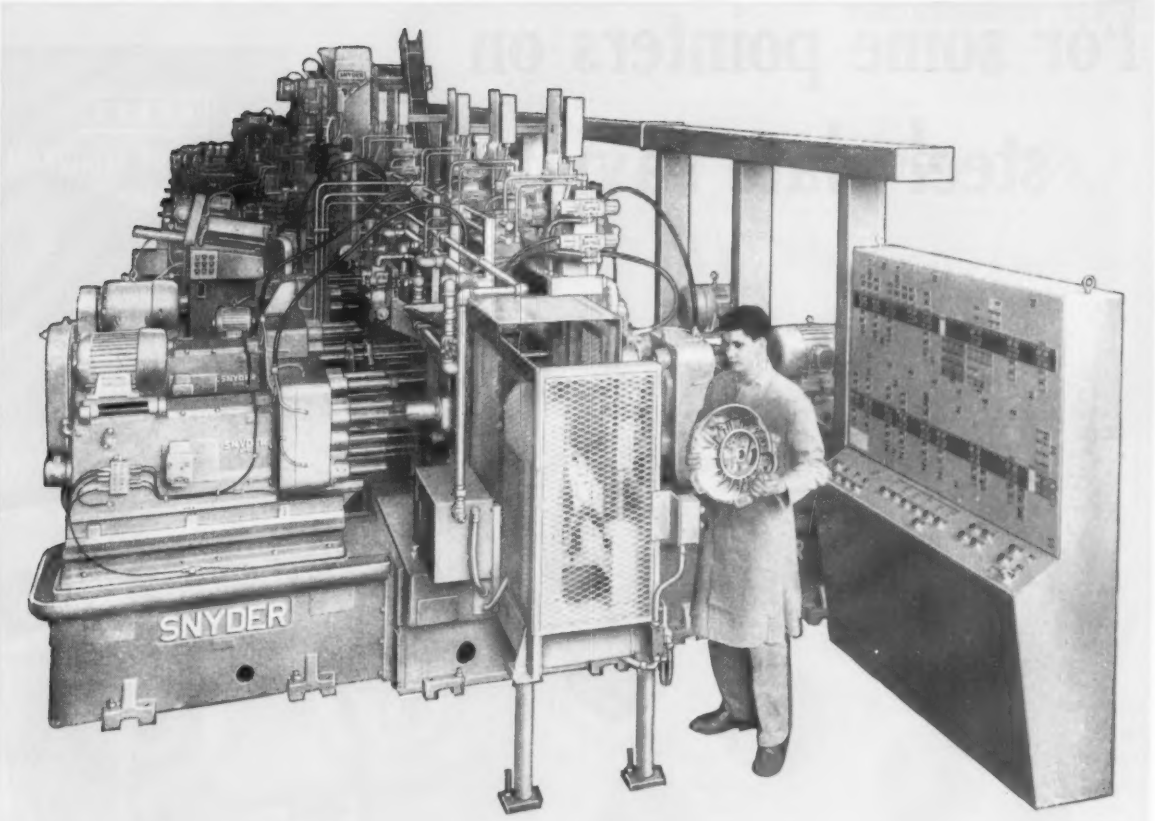
Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

What Will Package Cost?

It's too early to predict how much the UAW will win, but you're probably safe to figure on the same annual wage increase of 2.5 per cent, or 6 cents, plus about 4 cents in fringes. That's a higher fringe ratio than in industry generally, shows a U. S. Chamber of Commerce survey of 1064 firms.

One thing does seem certain. Big Three automakers will present a united front, and they'll probably bargain "in public."

American Motors Corp. may go it alone. Its contract expires a week later than the rest. George Romney, AMC's president, has displayed a notable lack of "industry togetherness" on many previous occasions. Studebaker-Packard Corp. is expected to adopt the Big Three pattern.



DIFFERENT SIZED PARTS INTERMIXED AT RANDOM ARE PROCESSED AUTOMATICALLY ON SNYDER SPECIAL 56-STATION TRANSFER

Here's another big Snyder special "building-block" transfer with a bit of extra versatility.

Specifications called for one sequence of operations on a big aluminum transmission cover case for domestic use and a different sequence on a smaller cover for export.

Schedules set a production rate of about four domestic units to one export unit but, for production convenience, the machine had to accept these parts intermixed at random and run them through automatically.

So, Snyder Engineering designed a "collar" which bolts to the smaller piece, bringing it up to locating and clamping dimensions of the larger piece. Lugs on the collar and workpiece control appropriate switches which by-pass certain operations. Parts are automatically positioned in process.

Operations include drilling, reaming, boring, tapping, chamfering, spotfacing, center holing, end milling, probing, air gaging, pressing in rectangular plug, pressing in bushing and a couple of washing operations.

Production is 150 parts an hour at 100% efficiency. Any of the 20 segments can easily be converted for comparable operations on other parts and the number of segments can be increased or reduced at any time. Your inquiries are invited.

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For some pointers on steel plate savings...

This illustrated 16-page booklet outlines the Steel Plate Shapes Service available from Lukens Steel Company; describes scores of typical shapes produced on Lukens facilities; points out the cost-cutting features of this "pre"-fabricating service: *savings* on steel freight costs, scrap handling expense, shop spoilage, capital investment. For your free copy, simply fill in and mail this coupon.

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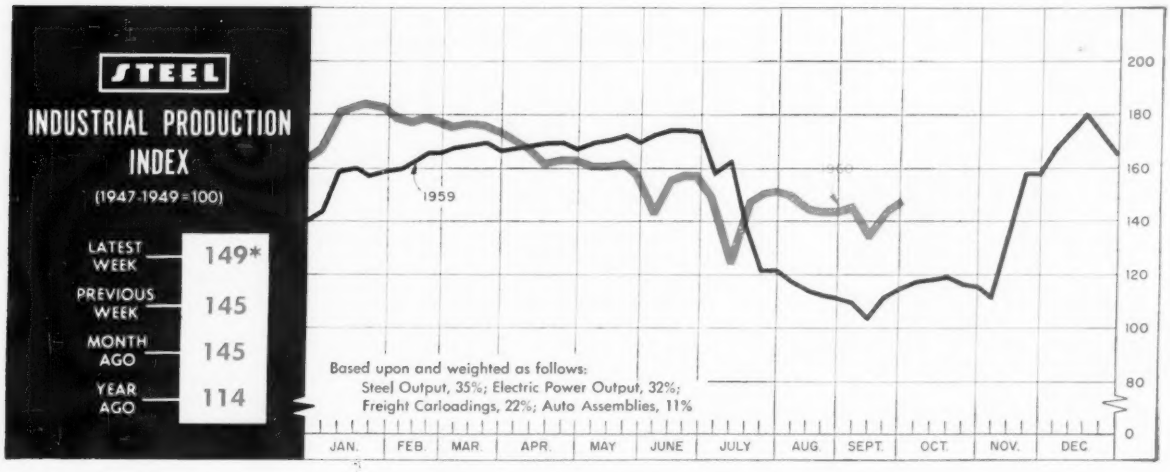


*Week ended Sept. 24.

Seasonal Upturn Still Underway

WE'RE IN the early stages of a cyclical recession, but some of its impact is now being cushioned by a seasonal upturn.

• **Case in Point**—STEEL's industrial production index above is indicative of what is happening in many areas. After showing signs of faltering in August, it made a fair recovery during September. At a preliminary 149 (1947-49=100), during the week ended Sept. 24, it reached the highest point in seven weeks.

Even though 149 is still significantly beneath the first half average of 170, the moderate comeback following Labor Day indicates that this recession will be held in bounds by basic strengths which kept the other three post-World War II recessions from becoming major setbacks.

Over the short term, the index will find its strength in two main sectors: Steel and autos. Both should continue to gain gradually through October. Not until the acceptance of 1961 model automobiles can be measured (probably by late October or early November) will it be possible to look into late fourth quarter with any degree of assurance.

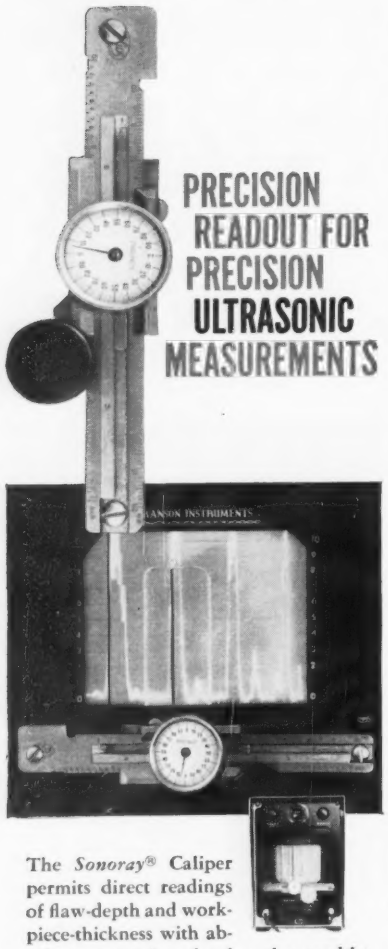
• **Alternatives**—If demand is good, and automakers hold to their schedules—or at worst make only nominal cutbacks — steel production should hold at a moderately good level. When you add a seasonal upturn in electricity output, chances are about even that the production index will hold steady until the end of the year.

If car schedules are cut appreciably, steelmakers will find their main cause for optimism somewhat weakened. With steel production, auto output, and railroad freight carloadings (seasonally off following the end of the Great Lakes navigation season) all heading downward, even record-breaking consumption of electricity by commer-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,545[1]	1,547	362
Electric Power Distributed (million kw-hr)	14,000[1]	13,903	12,878
Bituminous Coal Output (1000 tons)	8,135[1]	6,490	7,803
Crude Oil Production (daily avg—1000 bbl)	6,850[1]	6,847	6,858
Construction Volume (*ENR*—millions)	$368.4	$423.3	$406.6
Auto, Truck Output, U. S., Canada (*Ward's*)	141,660[1]	109,822	119,137
TRADE			
Freight Carloadings (1000 Cars)	600[1]	599	587
Intercity Truck Tonnage (changes from year ago)	−1.1%	+0.4%	+17.4%
Business Failures (Dun & Bradstreet)	305	276	264
Currency in Circulation (millions)[3]	$32,171	$32,291	$31,984
Dept. Store Sales (changes from year ago)[3]	−5%	−2%	+16%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$31,456	$26,499	$26,426
Federal Gross Debt (billions)	$288.5	$288.6	$288.7
Bond Volume, NYSE (millions)	$23.4	$18.7	$44.6
Stocks Sales, NYSE (thousands of shares)	14,930	12,072	16,011
Loans and Investments (billions)[4]	$105.5	$105.1	$104.1
U. S. Govt. Obligations Held (billions)[4]	$27.5	$27.4	$28.9
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	230.1	230.0	225.2
All Commodities[7]	119.4	119.4	119.6
Commodities Other than Farm & Foods[7]	128.2	128.3	128.3

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.



PRECISION READOUT FOR PRECISION ULTRASONIC MEASUREMENTS

The *Sonoray*® Caliper permits direct readings of flaw-depth and work-piece-thickness with absolute accuracies of a few thousandths of an inch, the relative accuracy increasing with thickness. Thus the ultrasonic-pulse *Sonoray*®, pre-eminent for flaw detection, can now be used additionally for high-precision measurement of thickness.

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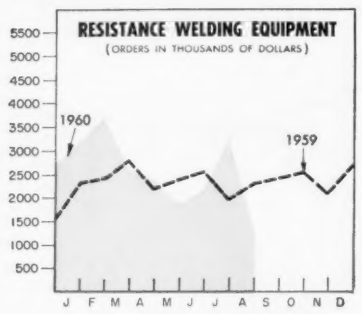
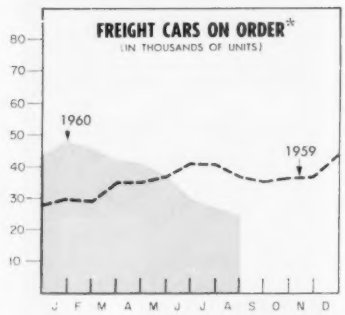
THE BUSINESS TREND



	Net Orders		Shipments	
	1960	1959	1960	1959
Jan.	3,258	2,396	1,582	1,427
Feb.	3,732	2,457	2,563	1,889
Mar.	2,653	2,811	3,011	2,179
Apr.	2,446	2,258	2,943	2,193
May	1,871	2,407	2,310	2,019
June	2,205	2,597	3,267	2,702
July	3,244	1,980	2,221	2,269
Aug.	1,330	2,322	2,528	2,928
Sept.	....	2,435	....	2,113
Oct.	....	2,599	....	2,097
Nov.	....	2,131	....	1,597
Dec.	....	2,768	....	2,353
Totals	....	29,161	....	25,766

Resistance Welder Manufacturers' Assn.



	Domestic Awards		Backlogs (end of month)	
	1960	1959	1960	1959
Jan.	7,149	4,102	48,170	29,470
Feb.	3,411	1,812	46,323	28,789
Mar.	1,959	10,782	42,131	35,487
Apr.	5,551	3,736	41,003	35,479
May	2,234	5,253	36,106	36,869
June	321	8,369	29,555	40,973
July	1,306	4,159	26,658	40,309
Aug.	1,343	1,653	23,866	37,172
Sept.	....	943	.....	35,626
Oct.	....	2,722	.....	36,199
Nov.	....	2,424	.....	36,555
Dec.	....	10,560	.....	43,870
Total	....	56,495		

*Domestic only.
American Railway Car Institute.

cial and residential users could not stop the downtrend.

• **Some Good News**—As in the last three general recessions, some segments are apparently feeling little, if any, ill effects. The National Industrial Distributors' Association reports that its member sales in August were 8.7 per cent better than they were in July. For eight months of 1960, sales were up 1.1 per cent over the corresponding period of last year.

Makers of industrial furnaces had a 97 per cent gain in August compared with July, states the Industrial Heating Equipment Association Inc. Orders totaled $7,840,000.

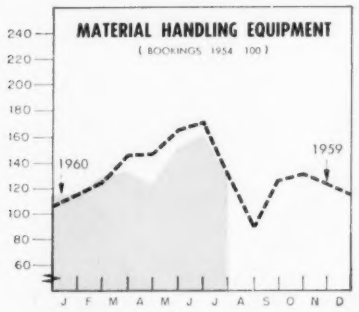
Gas water heater producers set an all-time record for shipments in August. At 279,400 units, the total topped the previous record set in August, 1955, by 3800 units, says the Gas Appliance Manufacturers Association.

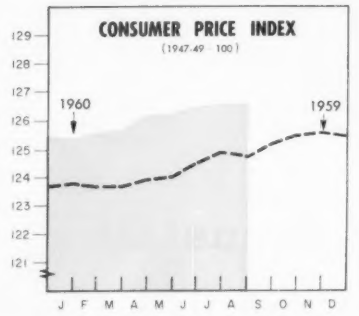
Producers of resistance welding equipment shipped more than $2.5 million worth of equipment in August, the fourth time this year they have beaten that mark. While orders were down (see graph and table above) the total for the first eight months was still 16 per cent ahead of the year-ago pace.

Railroad freight carmakers boosted shipments in August to 4124 units compared with 3893 in July. At the same time, new orders showed a slight improvement. However, backlogs continued the downtrend which dates back to the first of the year (see graph and table above).

• **But Not All Good**—Some of the sour news we're getting these days goes far enough back that it may or may not have any bearing on the current situation. (Some statistics aren't available until two or three months after the *fait accompli*).

For instance, the Material Handling Institute Inc. reports that its new order index for July dropped more than 33 points after climbing to the year's high in June. (See graph and table above.) While a decline in the summer months is not particularly surprising, one of such magnitude can be cause for concern when other factors are weakening. However, C. L. Fell, president of the institute and vice president-marketing for American Monorail Co., Cleveland, declares: "We are still optimistic about increased bookings for the rest of this





	1960	1959	1958	1957
Jan.	114.96	115.84	93.07	126.34
Feb.	128.74	124.77	93.49	139.29
Mar.	133.60	146.36	97.89	140.76
Apr.	122.41	147.28	122.36	132.67
May	150.33	164.45	118.04	157.95
June	160.23	170.72	131.15	121.57
July	126.79	130.26	134.34	128.31
Aug.	.....	87.02	104.46	110.09
Sept.	.....	126.43	85.41	116.79
Oct.	.....	131.09	111.35	124.80
Nov.	.....	124.16	110.88	87.80
Dec.	.....	113.78	105.97	105.65
Avg	.....	131.85	109.87	124.34

Material Handling Institute Inc.
Charts copyright, 1960, STEEL.

	1960	1959	1958
Jan.	125.4	123.8	122.3
Feb.	125.6	123.7	122.6
Mar.	125.7	123.7	123.3
Apr.	126.2	123.9	123.5
May	126.3	124.0	123.6
June	126.5	124.5	123.7
July	126.6	124.9	123.9
Aug.	126.6	124.8	123.7
Sept.	....	125.2	123.7
Oct.	....	125.5	123.7
Nov.	....	125.6	123.9
Dec.	....	125.5	123.7

U. S. Bureau of Labor Statistics.

year." In September, when MHI held its annual meeting, members felt that sales this year would barely miss the $632.9 million set last year. And they look for a slightly better year in 1961.

Transistor manufacturers also announced a decline in sales during July. Even though unit and dollar sales dropped to their lowest points of the year, they still exceed comparable 1959 figures by a large margin, reports Electronic Industries Association.

Construction Gaining

Although STEEL's Panel of Economic Consultants is not particularly bullish on over-all construction (see Page 39), this may yet be one of the most important industries in turning the business trend up next year. F. W. Dodge Corp. reports that nonresidential building and heavy engineering contracts in August pushed total contracts for the month 7 per cent ahead of the year-ago mark. It's the first time this year that the corresponding 1959 period has been topped. *Engineering News-Record's* tally of heavy construction contracts through the first 38 weeks of 1960 now stands 10 per cent above the similar 1959 total. Considering the lag between contract awards and the start of construction, it seems that a fair portion of the increase must drip over into next year, just at a time when the economy will need it.

Trends Fore and Aft

- Blaw-Knox Co. reports that its order volume for rolling mills (and auxiliary equipment), plus annealing, galvanizing, and tinning lines is ahead of the pace of the last two years.
- Texas Eastern Transmission Corp., Houston, will spend more than $125 million between now and 1962 to expand its daily delivery capacity. Much of the money will go into pipelines and auxiliary equipment.
- Bank clearings in the week ended Sept. 21 reached an all-time high of $31.5 billion. During the same week, department store sales—another indicator of consumer spending—dropped 5 per cent under the year-ago level.
- Pointing up the tremendous growth rate in the electronics industry, International Resistance Co., Philadelphia, says it expects sales to increase upward of 250 per cent within the next five years.

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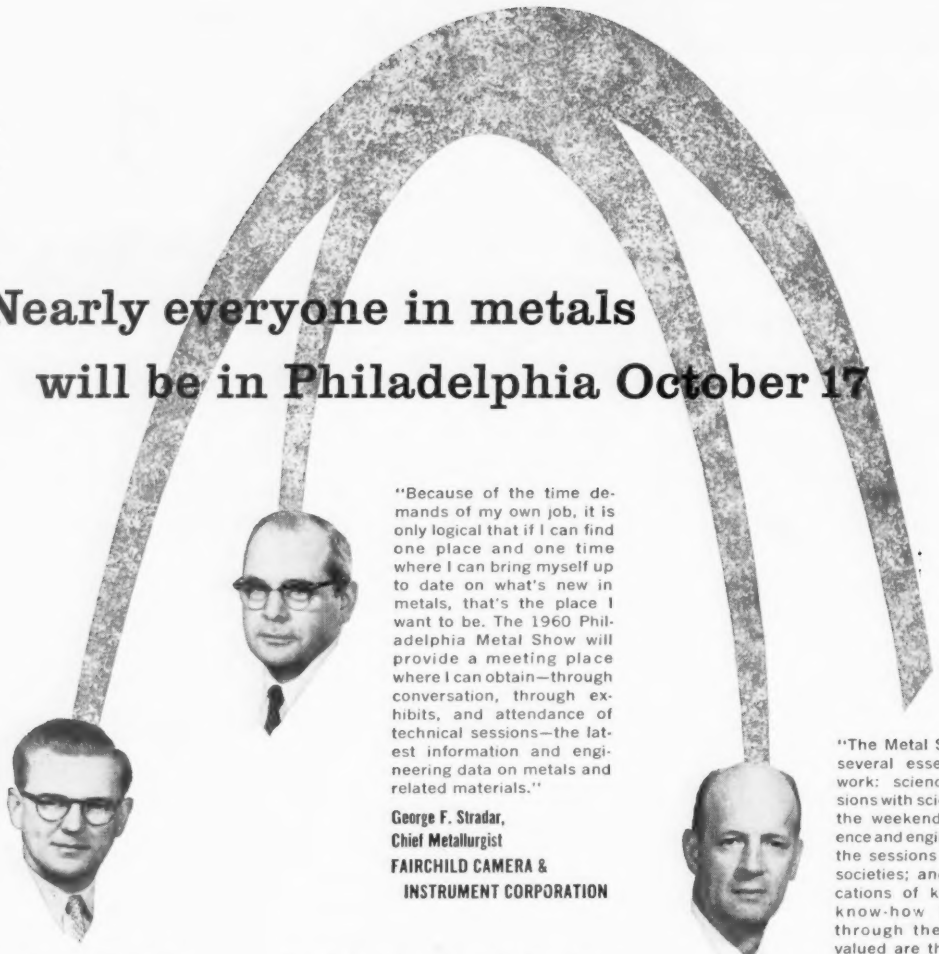
Nearly everyone in metals will be in Philadelphia October 17



"Because of the time demands of my own job, it is only logical that if I can find one place and one time where I can bring myself up to date on what's new in metals, that's the place I want to be. The 1960 Philadelphia Metal Show will provide a meeting place where I can obtain—through conversation, through exhibits, and attendance of technical sessions—the latest information and engineering data on metals and related materials."

George F. Stradar,
Chief Metallurgist
FAIRCHILD CAMERA & INSTRUMENT CORPORATION

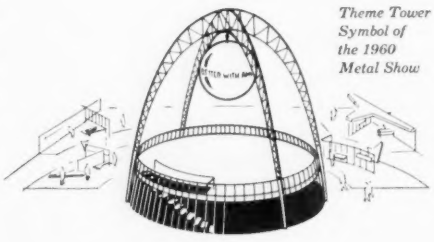
"ASM brings together in one place and at one time the year's most important developments in the technical and practical aspects of the metals industry. Never have I left a show without several ideas for applications of materials, equipment or processes in my engineering work. The 1960 Metal Show promises me more 'take home' than ever."

Raymond J. Hibbeln,
Dept. Chief, Product & Development Engineering
WESTERN ELECTRIC COMPANY

That's how important the 1960 Philadelphia Metal Show will be . . . not only to the recognized leaders but to those on the way up in metals and materials technology. Everyone will look to this event as a vital concentration of the latest thought and achievement. Your participation is a must for keeping technologically up to date, and the Metal Show does meet this need. This year a new emphasis on metals and materials, processes and techniques will be presented by 300 exhibits and 250 technical papers. PLAN NOW TO ATTEND!

"The Metal Show gives me several essentials for my work: science and discussions with scientists through the weekend seminar; science and engineering through the sessions of the several societies; and finally applications of knowledge and know-how to products through the Show. Most valued are the friends and the stimulating discussions with them."

John P. Howe,
Research Director
Atomics International
NORTH AMERICAN AVIATION



Theme Tower Symbol of the 1960 Metal Show

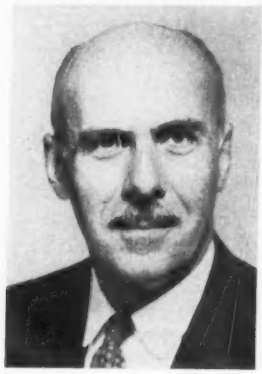
NATIONAL METAL CONGRESS and EXPOSITION

Philadelphia Trade & Convention Center • October 17-21

Sponsored by the AMERICAN SOCIETY FOR METALS *Metals Park • Novelty, Ohio*

Cooperating Activities: The Metallurgical Society of AIME; Society for Non-destructive Testing, Inc. Associations presenting technical sessions in cooperation with ⊛: Metal Powder Industries Federation; Metal Treating Institute; Ultrasonic Manufacturers' Association; Industrial Heating Equipment Association; Special Libraries Association—Metals Division; American Society for Testing Materials—Committee B-9; and extensive research and engineering programs of the American Society for Metals, and ⊛ Seminars.

C. H. H. WEIKEL
Bethlehem Steel v. p.



STEWART B. ASHTON
joins C. I. Hayes Inc.

CARL S. ABLON
Luria Bros. exec. v. p.

JOHN G. SAUER
Universal-Cyclops div. sales

C. H. H. Weikel, assistant to the president of **Bethlehem Steel Co.**, Bethlehem, Pa., for the last three years, was named a company vice president. He will head a newly created Research Dept. which consolidates the Research Div. of the Steel Operating Dept.; the Commercial Research & Industrial Development Div. which has been part of the Sales Dept.; and the Raw Materials Research Div., formerly in the Mining Dept.

George E. Doty, vice president-sales, was promoted to vice president and general sales manager, **Grove Valve & Regulator Co.,** Oakland, Calif. He is in charge of all sales activities. **B. J. Hancock**, former Eastern regional sales manager, was named vice president-sales, responsible for all field sales. His office will be in Houston. **E. C. Bird** was named a district sales manager in Houston.

Ray W. Thompson was appointed general sales manager, Marketing Div., **Square D Co.** He is in new corporate headquarters in Park Ridge, Ill. He was Midwestern regional manager, and is succeeded by **Kurt Morris** who will be in offices of the Schiller Park, Ill., plant.

Stuart E. Weaver and **Harry B. Horne** were elected vice presidents of **Marquardt Corp.,** Van Nuys, Calif. Mr. Weaver's duties include market research, company - sponsored research and development, public relations and district field offices. Mr. Horne was director of corporate planning and continues responsibility for that function.

C. I. Hayes Inc., Cranston, R. I., appointed **Stewart B. Ashton** chief engineer. He was chief development engineer for E.S.I. Bridgeport Laboratories, division of Eversharp Inc.

Carl S. Ablon was elected executive vice president, **Luria Bros. & Co. Inc.,** New York. He was regional vice president in charge of Midwestern operations for Luria, a division of Ogden Corp. Mr. Ablon is responsible for all activities of Luria and subsidiaries, and will report to the president.

A. G. Dixon was elected president of **Modine Mfg. Co.,** Racine, Wis., to succeed **C. T. Perkins,** named vice chairman of the firm. Mr. Dixon was executive vice president.

Paul E. Warburgh was named manager of sales, Special Products Div., **Avery & Saul Co. Inc.,** Cambridge, Mass. He was in management posts with fabricating divisions of Continental Copper & Steel Industries Inc.

R. M. Hatcher was made manager of applied manufacturing research and process development at **Convair Div.,** San Diego, Calif., General Dynamics Corp. He was chief of organizations and systems at Convair's Ft. Worth, Tex., Div.

Emcor Ingersoll Products Div., Borg-Warner Corp., Elgin, Ill., appointed **Edward P. La Kaff** chief engineer and **Donald R. Carlson** division sales supervisor. Mr. La Kaff was design engineer for Borg-Warner's Roy C. Ingersoll Research Center, Des Plaines, Ill.

John G. Sauer was appointed sales manager, Refractomet Div., **Universal-Cyclops Steel Corp.,** Bridgeville, Pa. He previously served in sales and engineering capacities with Union Carbide Metals Co., and American Radiator & Standard Sanitary Corp.

Miles M. Zoller, vice president, **Eagle-Picher Co.,** Cincinnati, was named president of its Chemicals & Metals Div. **William D. Atteberry** was named executive vice president of the division; **Donald R. Carter** vice president-sales; **Claude O. Dale** vice president-mining; **Melvin F. Chubb** vice president-electrochemical.

George S. Trees was elected a vice president of **Chicago Bridge & Iron Co.,** Chicago. He was named a regional sales manager earlier this year.

F. Leonard Bryant was elected executive vice president, **Hooker Chemical Corp.,** Niagara Falls, N. Y.

William J. Bernat was appointed general superintendent of the Charleston, S. C., plant of **Pittsburgh Metallugical Co.** He succeeds **Theodore E. Dann,** transferred to the Calvert City, Ky., plant as manager.

James C. Steffan was elected president, **Chicago Steel & Wire Co.,** Chicago, succeeding **Dana Summers,** retired. Mr. Steffan was vice president-sales manager.

John C. J. Hebron was made sales manager, **Ketay Dept.,** Norden Div.,

HERBERT L. KARSCH
joins Aeronutronic Div.

HOWARD F. WILSON
Aluminum Extrusions plant mgr.

JAMES P. KENNEDY
Ace Abrasive Lab. sales

LEONARD J. SYNK
Republic div. metallurgist

United Aircraft Corp., at Commack, N. Y.

Herbert L. Karsch, former manager of Aerospace operations for General Motors Corp.'s Defense Systems Div., joined **Aeronutronic Div.** of Ford Motor Co., Newport Beach, Calif., as manager of Space Technology Operations' Space Systems. He succeeds **Ralph P. Morgan,** named special assistant to D. B. Duncan, general operations manager of Space Technology Operations.

Harold H. Mitchell joined **King Machine & Mfg. Co.,** Los Angeles, as vice president in charge of engineering, machine work sales, and special products. He was chief engineer of Kelman Power Circuit Breaker Div., I-T-E Circuit Breaker Co.

John D. Zurcher was made general sales manager, **Kensington Steel Div.,** Poor & Co., Chicago.

Andrew R. Kasprisin was appointed superintendent of the Sheridan blast furnace plant of **E. J. Lavino & Co.,** Philadelphia. He spent ten years at the North Braddock Works of U. S. Steel Corp. before joining E. J. Lavino as assistant superintendent.

Stuart F. Cooper was appointed assistant general sales manager, **Cooper Alloy Corp.,** Hillside, N. J. Since 1959, he has been sales manager, Vanton Pump & Equipment Div., and continues this post along with his new duties of sales management and sales co-ordination, assisting **Morton C. Meyers,** general sales manager.

John R. Strom fills the new post of technical director of **Ransohoff Co.,** Hamilton, Ohio.

Howard F. Wilson was named plant manager by **Aluminum Extrusions Inc.,** Charlotte, Mich. He was manager of the Wire-Wrap Div. of Gardner-Denver Co.

James P. Kennedy was appointed general sales manager for **Ace Abrasive Laboratories Inc.,** Mineola, N. Y.

John L. Turnbaugh was made manager of **Black & Decker Mfg. Co.'s** Towson, Md., plant. He replaces **Karl B. Salanda,** resigned. Mr. Turnbaugh was tool engineering manager.

Henry M. Margolis was named chairman of **Elgin National Watch Co.,** Elgin, Ill. He is chairman of Aero Supply Mfg. Co. Inc., and has been a member of the Elgin board since 1958. **George J. Daly Jr.,** executive vice president and treasurer, continues as chief executive officer.

Seneca Falls Machine Co., Seneca Falls, N. Y., appointed **Ray A. Young** vice president-sales; **Robert H. Eisengrein** vice president-Electronics Div. Mr. Young was general sales manager. Mr. Eisengrein was director of the Electronics Div.

Walter W. Edens was made assistant director, Research Div., **Allis-Chalmers Mfg. Co.,** Milwaukee. He was supervisor of metallurgical research.

Thomas T. Allison Jr. was named general supervisor of production planning for manufacturing operations at U. S. Steel Corp.'s **Tennessee Coal & Iron Div.,** Birmingham. He is succeeded by **Eric G. McGee** as general supervisor-production planning for raw materials.

Leonard J. Synk was appointed assistant chief metallurgist, Steel & Tubes Div., **Republic Steel Corp.,** Cleveland. He was senior metallurgist for the division.

Richard A. Denton was appointed vice president, High Vacuum Div., **Elion Instruments Inc.,** Bristol, Pa. He was general manager, Vacuum Equipment Div., New York Air Brake Co.

W. D. Cowgill succeeds **L. W. Christenson,** retired, as vice president-sales, **Cleveland Graphite Bronze Div.,** Clevite Corp., Cleveland. Mr. Cowgill was named general sales manager four months ago, after serving for eight years as Detroit sales manager.

Charles A. Baisch Jr. was appointed products manager, hot rolled and cold finished bars, for **Connors Steel Div.,** H. K. Porter Company Inc., Birmingham. At Porter's **Delta-Star Electric Div.'s** Thomas Works, Lisbon, Ohio, **Walter E. Taylor Jr.** was made manager of engineering; **William F. Hiel** manager of manufacturing; **J. A. Reynolds** manager of customer service.

Frank C. Riecks joined **Lester B. Knight & Associates Inc.,** Chicago, as senior associate. He will head a new Detroit office at 20111 James Couzens Highway.

Donald Keils was made general superintendent for **Valley Metal Products Co.,** Plainwell, Mich.

John J. Marin was transferred to Cleveland as regional sales engineer, Conveyor Div., **Columbus McKinnon Corp.**

Albert D. Farnum was made public

KENNETH H. COLVILLE JR.
Hendrick sales-marketing dir.

DONALD A. POTTER
Stewart-Warner v. p.

CURTIS H. LOCKE
Buffalo Forge sales post

ROBERT S. REAVES
A-C chief eng.-Tractor Wks.

E. C. TROY
joins National Engineering

W. G. GORDON
Dage Television Div. post

relations manager for **Wyman-Gordon Co.**, Worcester, Mass.

Robert S. Reaves was appointed chief engineer of **Allis-Chalmers Mfg. Co.**'s Tractor Works, West Allis, Wis., Farm Equipment Div. **Walter F. Strehlow** was named senior consulting engineer for the Tractor Group. Mr. Strehlow was chief engineer, and Mr. Reaves was assistant to the director of engineering, Tractor Group.

E. C. Troy joined **National Engineering Co.**, Chicago, as vice president-sales. He has served since 1958 as vice president of Pennsylvania Electric Steel Castings Co.

John H. Brinker Jr. joined **Cherry-Burrell Corp.**, Cedar Rapids, Iowa, as executive vice president. He held a similar post at J. I. Case Co., from which he resigned in July. He joined Case late last year following his resignation as vice president-general manager of A. O. Smith Corp.'s Permaglas Div. at Kankakee, Ill.

W. G. Gordon was made general sales manager and assistant division manager, **Dage Television Div.**, Michigan City, Ind., Thompson Ramo Wooldridge Inc. He is responsible for the sales program, as well as the over-all co-ordination of engineering, manufacturing, and sales. He was with the Data Processing Div., International Business Machines Corp.

Russell T. Cobb was made assistant sales manager, **Seymour Mfg. Co.**, Seymour, Conn. He was manager of sales-stainless steel, and marketing research manager. He continues those responsibilities.

Truman H. Bimesderfer was made manager of the Hagerstown, Md., plant planning, **Mack Trucks Inc.** He succeeds **J. J. McGuire**, recently made factory manager at the company's W. Front Street facilities, Plainfield, N. J.

L. Robert Meisenhelter was named a vice president of **Industrial Finishes Co.**, Philadelphia.

Kenneth H. Colville Jr. was named to the new post of director of sales and marketing, **Hendrick Mfg. Co.**, Carbondale, Pa. He has been secretary since 1953.

Donald A. Potter, general manager, Electronics Div., **Stewart-Warner Corp.**, Chicago, was elected a vice president of the corporation.

Curtis H. Locke was appointed sales manager, Machine Tool Div., **Buffalo Forge Co.**, Buffalo. He has been a sales-engineering representative with the company since 1947. He replaces **James Mossell**, retired.

Walter K. Palmer was made vice president and manager, **Kaiser Fleetwings Inc.**, Bristol, Pa., subsidiary of Kaiser Industries Inc. He continues management of the Kaiser Fleetwings plant in Bristol. **H. L. McKee** was made vice president and manager of **Kaiser Metal Products Co.**, also in Bristol.

Timken Roller Bearing Co., Canton, Ohio, elected **R. L. Frederick** a vice president in charge of International Divisions, and appointed **R. A. Gulling** (assistant treasurer) to the added post of controller.

Ivan H. Smith was named plant manager for the East Chicago, Ind., plant of **Graver Tank & Mfg. Co.** Most recently he was manager of the LaCrosse, Wis., plant of Trane Co.

Dr. Donald G. Wilson was named vice president-research of **P. R. Mallory & Co. Inc.**, Indianapolis. In addition to expanding Mallory's applied research program, he will establish additional research centers. Dr. Wilson was an assistant vice president of Stromberg-Carlson Div., General Dynamics Corp. He also served as assistant director of research for that division, and as general manager of Stromberg-Carlson's San Diego, Calif., plant.

OBITUARIES...

Harold L. Farling, 54, chief metallurgist of the Cleveland Div. of **Republic Steel Corp.**, died Sept. 26.

Donald K. Martin, 55, sales manager of steel mill equipment, **Surface Combustion Div.**, Toledo, Ohio, Midland-Ross Corp., died Sept. 15.

Metalworkers Seek Bigger Slice of World Markets

ADDITIONAL metalworking firms have taken steps to increase their participation in world markets. These announcements have been made recently:

• **World Crucible Ltd.**, a wholly owned subsidiary of Crucible Steel Co. of America, Pittsburgh, has purchased a 75 per cent interest in the Fonderie Acciaierie Milanesi Vanzetti S.p.A., Milan, Italy. Vanzetti is "a producer of high speed tool and stainless steels in bar form and cast products," says Joel Hunter, president of Crucible Steel.

"This acquisition will enable Crucible to enter and participate in the European Common Market," he adds. A new plant being built for the Vanzetti firm will cost about $5 million and will more than double the firm's present annual capacity of 7500 tons.

• **National Broach & Machine Co.**, Detroit, has organized an associate company in England to manufacture, sell, and service Red Ring gear production equipment, superprecision ball screws, and precision boring heads. The firm, Precision Gear Machines & Tools Ltd., Coventry, England, will be operated as an independent company. G. E. K. Blythe will be managing director. A 76,000 sq ft plant is being equipped with U. S. machine tools and special Red Ring production machines manufactured in the U. S.

• **Metals & Controls Div., Texas Instruments Inc.**, Attleboro, Mass., reveals that the parent firm's subsidiary, Australmac Ltd., has built a plant at Finsbury, South Australia, to fabricate solid and clad metal products. Australmac also operates a plant in Elizabeth, South Australia, for the production of motor protectors and starting relays. Robert P. Stevens is general manager of Australmac.

• **Detroit Electric Furnace Div., Kuhlman Electric Co.**, Birmingham, Mich., has made a license arrangement with the Forni Elettrometallurgici Co. of Italy to manufacture and sell 60 cycle, induction furnaces in North and Central America.

• **National-Standard Co.**, Niles, Mich., has become sole owner of National Standard Co. Ltd., Kidderminster, England. It formerly owned 78.5 per cent. In addition to its regular line of wire for rubber reinforcement, the English company this year started producing copper coated, steel wire for use as telephone lines. Further product diversification is planned.

• **Reynolds International Inc.**, subsidiary of Reynolds Metals Co., Richmond, Va., is participating (17 per cent equity) in construction of aluminum reduction and alumina facilities in Greece. Reynolds International will have the right to market 35 per cent of the plant's total output of 57,855 net tons of aluminum a year. Total investment for the group: About $75 million. The Greek government has agreed to provide hydroelectric facilities for power for the project estimated to cost $85 million.

• **Racine Hydraulics & Machinery Inc.**, Racine, Wis., formed Racine Hydraulics Co. Ltd. with headquarters at Zug, Switzerland. Gordon Fuller heads the wholly owned subsidiary which will provide the parent firm with fast service to European customers and technical liaison between Racine Hydraulics and its foreign licensees. The Swiss firm may eventually establish local assembly and manufacturing facilities.

• **Aluminium Ltd.**, Montreal, Que., announces that its two, recently created, fully owned subsidiaries have established aluminum fabricating plants in the West Indies. West Indies Aluminium Products Ltd. operates a plant in Kingston, Jamaica; Sprostons, (Trinidad) Ltd. operates one situated near Port of Spain, Trinidad. Both plants produce corrugated aluminum sheets and ancillary rain water goods from Alcan aluminum. Combined annual capacity: 3000 tons.

• **Pennsylvania Engineering Corp.**, New Castle, Pa., has licensed a British firm to sell and build its L-D oxygen furnaces and auxiliaries in the United Kingdom, Europe, Australia, and South Africa. The licensee is Ashmore, Benson, Pease & Co. Ltd., Stockton-on-Tees, a member of the Davy-Ashmore Group.

• **Uhrden Inc.**, Dennison, Ohio, is opening a plant at Kitchener, Ont., for production of floor and truck cranes, lift trucks, and industrial dumpers. W. A. Goodwin is vice president-sales for Canada.

American Brass Renamed

American Brass Co., Waterbury, Conn., will officially change its name to Anaconda American Brass Co. today (Oct. 3). The firm is a subsidiary of Anaconda Co.

Produces Silicon Metal

Reynolds Metals Co., Richmond, Va., has initiated production of silicon metal at its Sheffield, Ala., plant. A new electric furnace at the firm's Listerhill reduction plant is rated at 5000 tons (annual capacity). Output will be used to meet the demand of the foundry industry for silicon aluminum alloys.

Research Center Planned

A. O. Smith Corp., Milwaukee, will build an advanced research center at Middleton, Wis. Estimated cost: $2 million. Preliminary plans call for construction of a 50,000 sq ft building to house the research group. The laboratories will be devoted to advanced fields in solid state physics and physical chemistry of materials, as well as the energy processes involved in the utilization of such materials. New product developments utilizing the output of this research will be undertaken.

Homer Foundry Expands

Homer Foundry Corp., Coldwater, Mich., acquired the operations, certain of the machinery and equipment, and certain of the personnel of the Ideal Furnace Co., Milan, Mich. The combined production resulting from the consolidation at Coldwater will make Homer Foundry one of the largest independently owned gray iron foundries in the state. The company also owns and operates the Bay City Foundry Co., Bay City, Mich.

NEW OFFICES

Hull Corp., Hatboro, Pa., opened a branch office at 20666 Beachwood Dr., Cleveland 16, Ohio. The firm makes molding presses, vacuum furnaces, freeze dryers, impregnators, potters, and resin handling systems. Malcolm Adler is office manager.

Midwest Piping Co., St. Louis, opened a sales office in the Park Bldg., Fifth Avenue and Smithfield Street, Pittsburgh, Pa. W. M. Bushman is in charge of the office. The firm's products and services include welding fittings and flanges, fabricated piping, and piping system erection.

ASSOCIATIONS

Automotive Tool & Die Manufacturers Association, Detroit, changed its name to **Detroit Tooling Association.**

Instrument Society of America, Pittsburgh, elected these officers: President, Dr. R. H. Tripp, Grumman Aircraft Engineering Corp., Bethpage, N. Y.; president-elect-secretary, P. A. Sprague, Hays Corp., Michigan City, Ind.; treasurer, J. C. Koch, Conoflow Corp., Philadelphia; vice president-Technical Department, H. J. Noebels, Beckman Instruments Inc., Fullerton, Calif.; vice president-Standards & Practices Department, E. Albert Adler, United Engineers & Constructors Inc., Philadelphia; vice president-elect, Industries Department, J. J. McDonald, Consolidated Systems Corp., Monrovia, Calif.; vice president-elect, Education & Publications Department, F. R. Hoag, B. F. Goodrich Research Center, Brecksville, Ohio.

American Institute of Mining, Metallurgical & Petroleum Engineers Inc., New York, elected these officers for 1961: President, R. R. McNaughton, Consolidated Mining & Smelting Co. of Canada Ltd., Trail, B. C.; and president-elect, L. E. Elkins, Pan American Petroleum Corp., Tulsa, Okla. Vice presidents will be: J. S. Bell, Humble Oil & Refining Co., Houston; W. E. Glenn, Continental Oil Co., Houston; Dr. C. C. Long, Zinc Smelting Div., St. Joseph Lead Co., Monaca, Pa.; J. S. Smart Jr., American Smelting & Refining Co., New York; Dr. A. B. Cummins of Bound Brook, N. J., and J. W. Woomer of Pittsburgh.

NEW PLANTS

A diecasting plant for **Aluminum Co. of America**, Pittsburgh, is nearing completion near Edison, N. J. The plant is scheduled for occupancy this month and is a replacement for a diecasting facility at Garwood, N. J. It was designed and built by Wigton-Abbott Corp., Plainfield, N. J.

Wagner Electric Corp., St. Louis, Mo., has initiated production of fractional horsepower motors in its new plant at Brinkley, Ark. The building contains 90,000 sq ft of floor space.

A 40,000 sq ft plant is nearing completion at Guelph, Ont., for **National-Standard Co. of Canada Ltd.**, subsidiary of National-Standard Co., Niles, Mich. The $800,000 plant will have 35 per cent more manufacturing space than the facility it replaces. Principal products include bead and reinforcing wire for tires, rubber hose, and similar rubber goods. A spiral plater will initially produce copper plated, steel wire.

Mack Trucks Inc., Plainfield, N. J., will build a 1 million sq ft engine and transmission plant at Hagerstown, Md. Structural steel erection is scheduled to begin in mid-October with completion due Dec. 19.

Wilkerson Corp., Denver, is building a $250,000 facility at Englewood, Colo. The firm produces compressed air filters, regulators, lubricants, and drains for air-operated tools and machines.

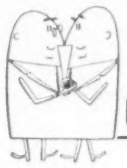
British Titan Products (Canada) Ltd. is constructing a $16 million plant at Tracy, Que., scheduled to be completed within two years. The firm produces titanium oxide.

Radio Corp. of America, New York, is gearing its new plant at Mountaintop, Pa., for full scale operation at a level of several million transistors and other semiconductors a month. The plant contains 120,000 sq ft of floor area.

NEW ADDRESSES

De Luxe Die Works Inc. moved its office to its plant at 8701 E. Eight Mile Rd., Warren, Mich.

Fenway Machine Co., moved to a larger plant at 1910 N. Marshall St., Philadelphia 22, Pa.



CONSOLIDATIONS

Electric Autolite Co., Toledo, Ohio, acquired **Marshalltown Mfg. Co.**, Marshalltown, Iowa, subject to approval of Marshalltown stockholders. The Iowa firm makes gages, thermometers, and hydrometers.

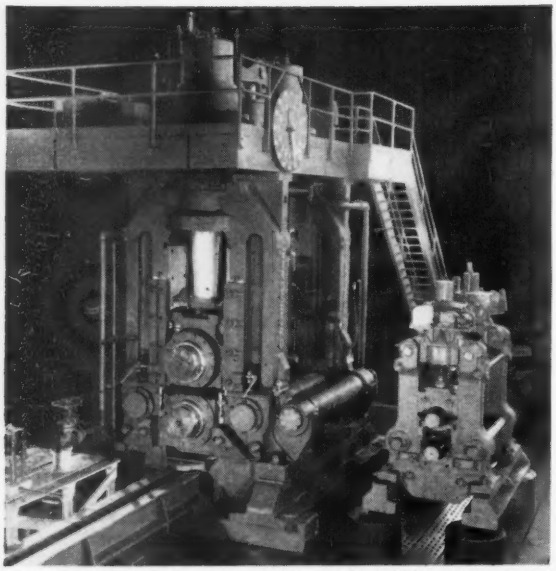
Eaton Mfg. Co., Cleveland, is acquiring **Dearborn Marine Engines Inc.**, Madison Heights, Mich., producer of inboard engines for pleasure boats. Dearborn Marine will be operated as a division of Eaton.

Hewitt-Robbins Inc., Stamford, Conn., and **Union Chain & Mfg. Co.**, Sandusky, Ohio, have merged. Union Chain will be operated as a division.

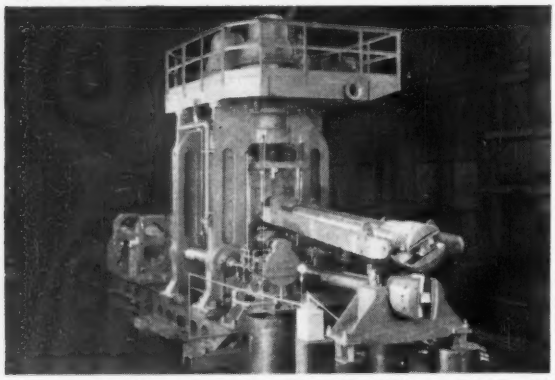
American Radiator & Standard Sanitary Corp., New York, will acquire **Rochester Mfg. Co.**, Rochester, N. Y., subject to approval of the latter's stockholders.

Howe Sound Co., New York, acquired **Combined Smelting & Trading Corp.**, Sewaren, N. J., and will operate the business under the name of Howe Refining Corp. Howe Refining will also perform the function of the Nonferrous Dept. of Frank Samuel & Co., a division of Howe Sound.

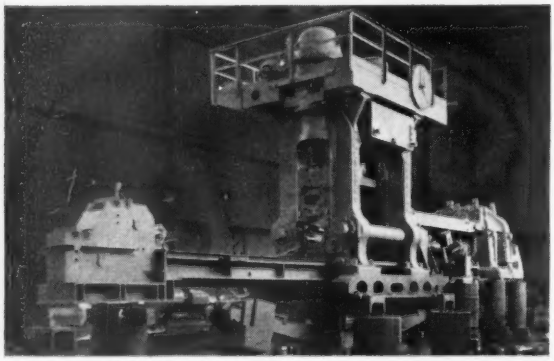
Raytheon Co., Waltham, Mass., acquired **Panels Wires Inc.**, San Francisco, supplier of computer and data processing accessories and other precision electromechanical components. Panels Wires will be operated as a part of Raytheon's Commercial Apparatus & Systems Div.



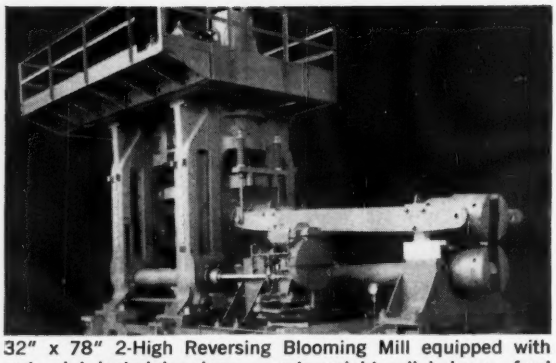
36″ x 78″ 2-High Reversing Billet and Slab Mill equipped with anti-friction bearings, hydraulic roll balance and a single roll changing rig. An 18″ Billet and Slab Mill is shown for comparison. This mill has water lubricated bearings and tilting cap housings.



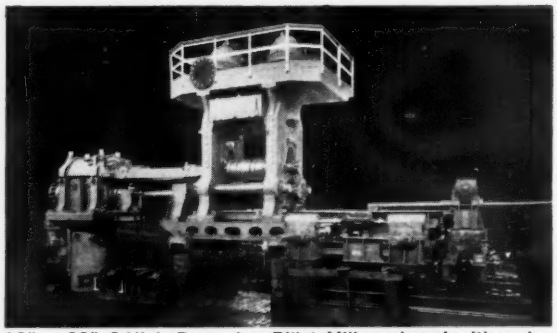
28″ x 70″ 2-High Reversing Blooming Mill equipped with water lubricated bearings, counterweight roll balance, feed rolls and a duplex roll changing rig.



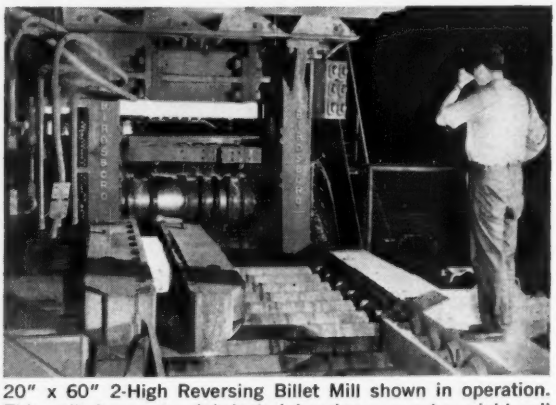
22″ x 66″ 2-High Reversing Blooming Mill equipped with water lubricated bearings, counterweight roll balance, feed rolls, and a crane operated single roll changing rig.



32″ x 78″ 2-High Reversing Blooming Mill equipped with water lubricated bearings, counterweight roll balance, feed rolls, and a duplex roll changing rig.



26″ x 66″ 2-High Reversing Billet Mill equipped with water lubricated bearings, counterweight roll balance, feed rolls, and a duplex roll changing rig.



20″ x 60″ 2-High Reversing Billet Mill shown in operation. This mill has water lubricated bearings, counterweight roll balance, and a duplex roll changing rig.

Blooming, Slabbing, Billet and Roughing Mills

designed and built by

MM 89-60

BIRDSBORO
CORPORATION

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL

Technical Outlook

NEW ALUMINUM PROCESS—Two Parisian producers, Pechiney and Ugine, have come up with a new way to produce molten aluminum which is said to reduce both production and primary investment costs (unlike the Aluminium Ltd. process which cuts only investment costs). A pilot plant (10 million lb a year) is expected to be on stream by the end of 1960.

BRIGHTER STAINLESS— First of General Electric's new bright annealing furnaces (see STEEL, June 9, p. 148) has just gone into operation at Wallingford Steel Corp., Wallingford, Conn. A second is on the way. GE's Industrial Heating Dept. developed the device which employs hydrogen to increase chromium concentration near the surface during annealing. Major use: Auto trim.

RUSSIAN WELD RESEARCH— The unusual advances in Russian welding technology you've been hearing about stem from a heavy concentration of researchers, a European source tells STEEL. The Paton Institute in Kiev employs 1300 technicians who work solely on welding problems; another in Moscow is supposed to house 2500.

RADIATION LIMITS BOLSTERED— Under new rules issued by the Atomic Energy Commission, persons working with or near radioactivity (x-rays, cobalt inspection equipment, and similar sources) will be permitted a lifetime dosage that is only a third the former limits. (Yearly dosage reduced to 5 rems from the former 15.) Amendments to the old regulations become effective Jan. 1, 1961.

IMPROVED GREASE HANDLING— Plants equipped with central storage facilities may receive 24,000 lb loads of bulk grease from pressure equipped trucks, states Cities Service Co., New York. The new system is designed to eliminate the overhead and storage costs of 400 lb drums.

MORE THERMIONICS— A cesium cell converter turns out 90 watts of electrical power from the heat of nuclear fission. Operating efficiency is 10 per cent at 3500° F and is supposed to be even better at ultrahigh temperatures. The developer, General Atomic Div. (San Diego, Calif.) of General Dynamics Corp., says output is about 134 watts per square inch.

FOAM-FILLED SATELLITES— Special purpose satellites may be launched as compact packages and inflated automatically in space with a plastic foam hardened by solar radiation. The Astro-Electronics Div. (Princeton, N. J.) of Radio Corp. of America is working on them.

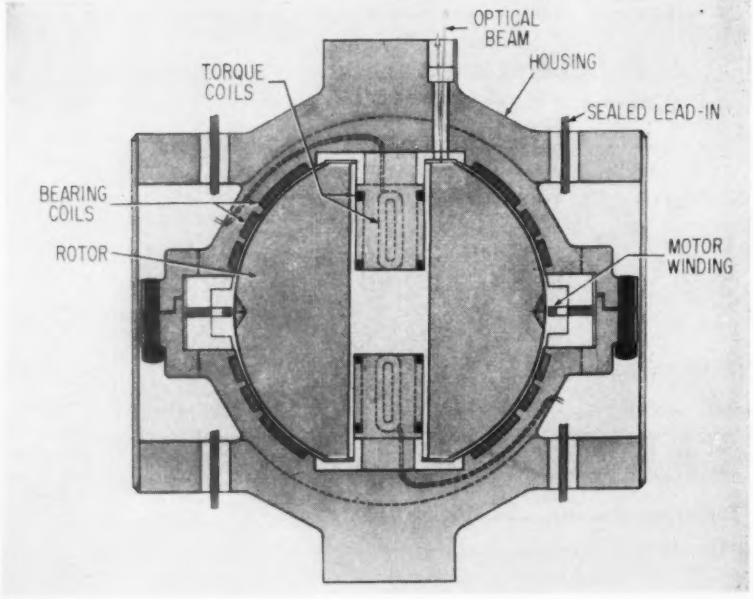
NEW THREAD LIMITS— Within a year, size limitations (3½ in.) for rolling threads should be lifted. Reason: A machine being developed by Landis Machine Co., Waynesboro, Pa., will roll parts 6 in. in diameter, forming either threads or special contours. With a 40 hp drive, the machine can deliver a 100,000 lb rolling force. Potential is about 25 automatic cycles a minute.

MEASURES GAS MASS—A mass flowmeter made by the Instrument Dept., General Electric Co., Schenectady, N. Y., measures gas flow continuously. The instrument is said to measure accurately without compensation for temperature, pressure, or density variations. It also works with powders and liquids.

ULTRASONIC ELECTRIC EYE— An ultrasonic control and switching device called Sonac depends on ultrasonic vibrations instead of light to count, weigh, size, sort, or route production items. It's not affected by vibration, dust, smoke, or light intensity, says Aro Equipment Corp., Bryan, Ohio.

READY DRAFTING IMPROVEMENT—A newly patented system is said to simplify the drawing of isometric and orthographic views on engineering blueprints. The inventor, Prof. Wayne L. Shick, General Engineering Department, University of Illinois, Champaign, Ill., calls it the United Drawing System and says that the only tool needed is a simple plastic quadrangle.

Once this sphere is set in motion in a new gyroscope, it may spin for years. The secret: Superconductivity makes it possible to suspend the sphere in a magnetic field. Drawing below shows the gyro design. Absence of bearings cuts electrical and friction losses.



Cryogenics:

Metalworking has started to cash in on changes that go with temperatures in the minus 400° F range. Electronics and missiles are early applications. More will come

WHEN you work with materials in the cryogenic range, you have to ignore much of what you know about their room temperature properties.

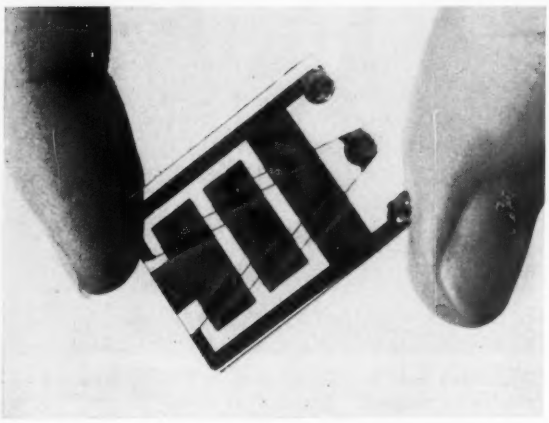
At these temperatures (approaching absolute zero, −459.6° F):

- Lead that's pliable at room temperature has the resiliency of a steel spring.
- A sapphire is some 60 times better as a heat conductor than room temperature copper.
- An electrical current started in a tin ring will coast indefinitely without losing any of its zip and with no additional boost from an outside source.
- The gas that's stored in a roomful of conventional steel pressure bottles can be held as a liquid in one "thermos bottle" about the size of a household water heater.
- The electronic circuitry that now fills a one car garage may soon fit a chamber smaller than a breadbox —and perform more reliably.
- Using superconductivity phenomena, it may be possible to make electrical switches with no moving parts, that are smaller than pinheads.
- Motors could approach 100 per cent efficiency.
- Frictionless bearings, that would never wear out, can be made.

• Cryogenics promises new knowledge and new applications. It has excited scientists in industry as well as universities.

Because metals and other materials do tricks that are impossible at room temperatures, General Electric has been able to develop a cryogenic gyro. It's based on suspending a

Open Sesame to New Properties



This is a six-cryotron circuit of tin and lead vaporized and deposited as thin films on glass. Devices like these by Arthur D. Little Inc., Cambridge, Mass., will cut computer construction costs

This 8 ounce cooling device superchills infrared detection equipment to −350° F. Helium gas expands from 300 psi in a ¼ in. diameter cylinder. A tiny piston is the only cold moving part

small metal body in a vacuum, rotating it by electrical means at high speed, without measurable electrical losses. James F. Young, laboratory general manager for GE's general engineering laboratory, states that the gyro should spin for months "or even years."

J. A. Hoyt, GE's Ordnance Dept. general manager, believes that the gyroscope will be many times more accurate than the best conventional types. It eliminates sources of error, and "since the world of supercold is a dead world where no chemical or organic change takes place, the sustained reliability of the cryogenic gyro will be vastly higher than that of conventional gyros," he states. It presages improved inertial guidance systems.

Dr. T. A. Buchhold, consulting engineer with the GE laboratory, who suggested the gyro application, visualizes many other developments using the principle of superconductivity. About 20 metals have no electrical resistance in the area near absolute zero. Currents once started flow indefinitely, unless deliberately interrupted, or unless the metal is warmed. Stable currents mean stable magnetic fields. And a magnetic field does not penetrate a superconductor —it's a magnetic shield. But a high enough magnetic field will destroy the property of superconductivity.

Those and other properties, says Dr. Buchhold, may lead to such things as an electron microscope more effective than ever before, perhaps permitting atoms to be seen; a standard of reference for current; frictionless bearings, suspending a superconductor in space; motors (using a rotating flux) which would be nearly 100 per cent efficient; gyroscopes; amplifiers with no drift and no "noise"; computer elements with no moving parts; frequency standard oscillators using resonant cavities; and power equipment such as transformers with reduced losses.

(The elements that become superconductors are: Aluminum, bismuth, cadmium, gallium, hafnium, indium, lanthanum, lead, mercury, columbium, osmium, rhenium, ruthenium, tantalum, technetium, thallium, thorium, tin, titanium, uranium, vanadium, zinc, and zirconium.)

• Missiles and spacecraft will be early beneficiaries of cryogenics.

Some missile experts figure that the Russian's spectacular space probes can be laid to the fact that they lead us in cryogenics—the use of liquid gases for rocket fuels.

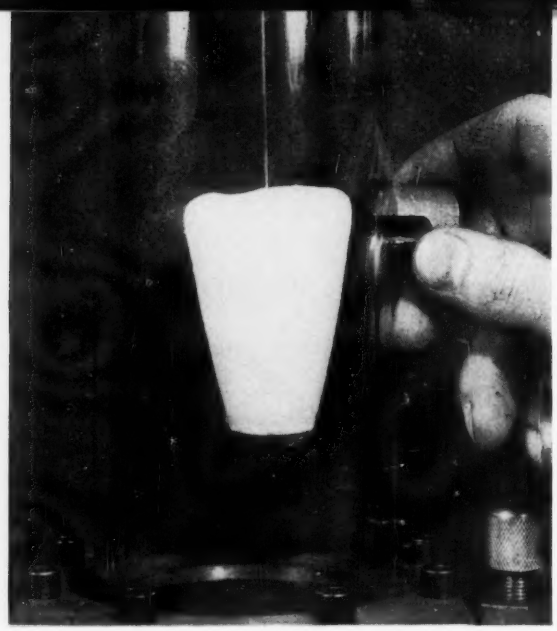
Propellents for missiles include hydrogen and oxygen. They're handled as liquids to save space and the weight of pressure containers. A structural problem arises because metals behave differently at these ultralow ranges. Tensile strengths increase, but toughness drops. Convair-Astronautics, San Diego, Calif., has developed a low temperature testing facility to evaluate metals, which can make tensile, notched tensile, and impact tests as low as −423° F. Since all-welded fuel tanks are mandatory, the tests include welds as well as the base stock.

Convair-Astronautics expects the development of special alloys for cryogenic applications may offer outstanding advantages. Higher purity alloys will mean fewer inclusions to act as loci for starting cracks.

At its Denver plant, Martin Co. has used liquid oxygen in the Titan. It is considering the use of liquid hydrogen. Engineers are investigating the properties of metals at −423° F (hydrogen boils there). Martin points out that the difference between the temperatures for liquid hydrogen and liquid oxygen may cause substantial differences in properties, although they are only about 125 degrees apart. Aluminum and stainless steels appear promising for such service. Also possible: Nickel base alloys, copper base materials, some alpha titanium, and some mag-

How Properties Change Near Absolute Zero

The three pictures at right show cryogenic behavior of materials. Theoretical studies are leading to commercial applications



This frozen cone is solid oxygen. It's being attracted by a permanent magnet. Scientists at Arthur D. Little Inc. say that gaseous oxygen has little magnetic potential

nesium alloys, says Martin.

Martin also feels that the welding problems may be the most difficult to solve; it will consider the possibility of mechanical joints in its test program.

• Electronics may be a big market. Sperry Gyroscope Co., Great Neck, N. Y., is probing electronic applications. The company is interested in the cryotron, a simple switching unit. Typically, it consists of a tantalum wire, around which is wrapped a fine columbium wire. A current through the columbium wire will switch the state of the tantalum conductor. The results are like those from triode vacuum tube. More advanced forms of the cryotron, using thin films, may make it possible to pack several million elements in an area that's only 1 sq in. Say Sperry's Allan Juster and Peter K. Shizume: "Such a high component density would make it possible to reduce present day computers to the dimensions of a matchbox."

International Business Machines Corp., New York, one of the leaders in electronic applications, is depositing thin films of lead and tin on thin glass surfaces, then cooling them cryogenically to get superconductivity. Switching speed is at least 50 times as fast as the fastest transistor. Another advantage: Microscopic size.

• Arthur D. Little Inc., Cambridge, Mass., has a number of interests in cryogenics.

Many laboratories use its Collins cryostat, a machine for developing the low temperatures required. Other designs are being developed in a continuing project. The firm's scientists are studying ways of producing ultralow temperatures, friction of metals under these conditions, magnetic reduction of temperatures, and insulation systems.

Another commercial product is the MinIRcooler, a miniaturized mechanical refrigeration device for cooling infrared sensing devices. (They respond to longer wave lengths at lower temperatures and are more sensitive.) Also, a cryogenic wind tunnel produces hypersonic speeds and outerspace conditions. It creates a high vacuum by "cryopumping"—freezing out the contained atmosphere. The process can aid in producing ultrahigh vacuum, beyond the range at which the diffusion pump is efficient.

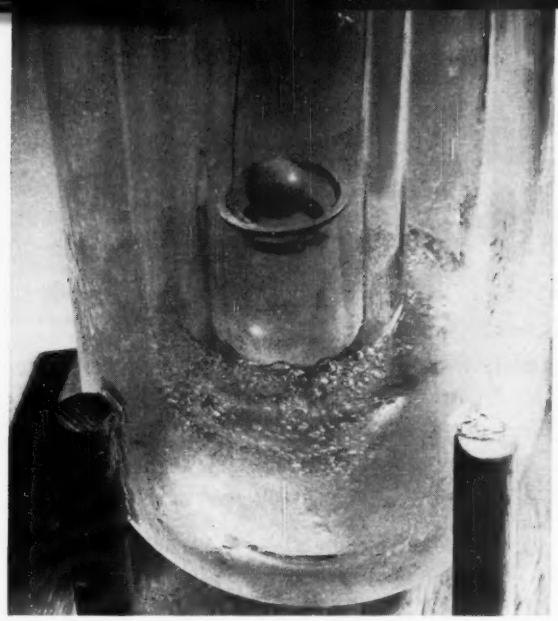
The company has also been involved in the design of handling equipment for cryogenic gases. Problems in piping, couplings, valves, and such components are complex, but 18 refrigerated dewars of 2000 liter (520 gallon) capacity for handling liquid hydrogen were constructed. Trucks with up to 3500 gallon capacity for liquid oxygen and nitrogen have been built. Losses due to boil-off were less than 0.75 per cent per day.

Arthur D. Little recently delivered to the Army's Watertown, Mass. Arsenal a tensile test cryostat which automatically measures the true stress and strain characteristics of materials at temperatures as low as −452° F. Expected in the future: Liquid hydrogen in fuel cells for surface propulsion, cryotronics, food storage, biological preservation. Cryogenic temperatures have been used to make it easier to bend stainless steel tubing, and there is a possibility that these temperatures will prove useful for the working of valve faces and bearing surfaces.

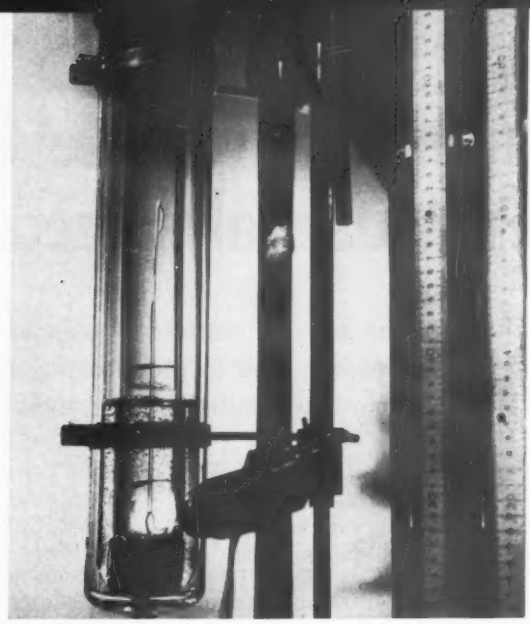
• Steel producers are also looking at cryogenic markets.

Stainless steels, says Allegheny Ludlum Steel Corp., Pittsburgh, have been used for tanks and piping for hydrogen and oxygen. Unusual advantage: The relatively poor heat conductivity of stainless steel helps in the insulation problem. Other alloys are being looked at to lower costs and improve life. International Nickel Co., New York, has found that nickel aids in promoting low temperature serviceability. And lowering the carbon helps at low temperatures.

Linde Co., a division of Union Carbide Corp., New York, has



Illustrating superconductivity, this lead ball is floating—suspended by magnetic fields of currents in lead rings. At room temperature, lead is not considered a good conductor



Liquid helium spurts up in a fountain, energized only by a light source. The light, aimed on the superfluid helium pool, excites the liquid and drives it up the small tube

studied many materials of construction and prepared technical reports for publication. Its studies of austenitic manganese steels showed that nitrogen aids the stability of austenite at low temperatures but reduces the impact properties—unlike some other austenite stabilizing elements. Oversimplification in thinking of metals for cryogenic applications is a source of many pitfalls, the company warns.

Battelle Memorial Institute, Columbus, Ohio, is active in the study of low temperature properties of metals. Battelle's J. E. Campbell, cites these metalworking problems:

- It is necessary to know the properties of metals at low temperatures to design cryogenic equipment.
- Following design, suitable manufacturing methods are required. Extra care in all stages is a necessity.
- Special inspection techniques will be needed.
- Quality control involves not only the finished units but also each lot of the material used to make sure it will stand up.

• The first large scale commercial sale of a cryogenic product has been liquefied gas.

Although the opportunity for metalworking companies to cash in on some of the exotic product applications is a growing one, most companies will get their first experience with cryogenics by using liquid gas for torch cutting, welding, oxygen steelmaking, and similar jobs.

Most of the suppliers of industrial gases now offer them in the liquid state. Leaders include Linde Co., a division of Union Carbide Corp., Air Reduction Co., and Air Products Inc.

Two big advantages to their customers: The liquid can be stored in a fraction of the space taken by the gas; both operating and vender service costs may be lower.

At Ryan Industries Inc., Cleveland (one of the large builders of cryogenic tanks), standard gas bottles had to be changed six times each day for torch cutting. One of the cryogenic tanks now lasts two full days.

As for space, a 337 gallon container for liquid gas stores the equivalent of 35,000 cu ft of gas. It takes the place of 140 conventional cylinders—yet it's only 48 in. wide, 61 in. long, and 10 ft high.

The most commonly stored gases are nitrogen, oxygen, argon, hydrogen, and helium. The market for these liquid gases is estimated to run close to $250 million a year, including industrial, hospital, and missile applications.

R. M. Haas, vice president at Ryan, feels that by 1965, "90 per cent of all gas capacity will be in liquefied systems." (STEEL, May 16, p. 96.)

The boom in commercial cryogenics is still ahead. Solutions to some perplexing material and component problems are still needed.

The experts are sure that cryogenics offers a diverse and large market for many industry segments, but companies that enter the field, either as makers of cryogenic products or as suppliers of materials and components, are in for some technological surprises. As the late Dr. A. Wexler, a cryogenic pioneer at Westinghouse Research Laboratories, put it: "In the world of low temperatures, one, like Alice in Wonderland, must be prepared for surprises and for the unfamiliar."

James F. Young, general manager of GE's laboratory, says: "We are about to enter an era in which developments of great import to mankind will stem from application work in this relatively new field." He feels the present state of the work in cryogenics can be compared to the state of electrical engineering during the second half of the 19th Century.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.

Integral Chromate Coating Protects Galvanized Strip

Chemical reaction of dissolved chromium compounds with the zinc surface is said to produce a gel-like coating that's resistant to corrosive materials and environments

PREVENTION of white rust formation on sheets stored in a humid environment has been a perennial problem for strip galvanizers.

Officials in the galvanizing department at Weirton Steel Co., Weirton, W. Va., a division of National Steel Corp., think they have found the best answer so far in a protective film process developed by Allied Research Products Inc., Baltimore.

• The process produces a conversion coating that minimizes the attack of moisture on zinc surfaces.

Chromates, dichromates, and chromic acid have been used for several years as dips or sprays to protect galvanized surfaces.

"But chromium compounds alone do little more than apply an unbonded chromium bearing film," says Harry J. Hartman, Allied research chemist. "The film doesn't adhere to the metal; under moist conditions, it is readily dissolved and carried away, and corrosion protection is virtually eliminated.

"To be most effective, the film must be an integral part of the zinc surface. A controlled chemical reaction between the zinc and the chromium compound in solution produces a clear, thin, conversion coating. When it is dry, the film minimizes the attack of moisture on the zinc. Corrosion protection offered by the conversion coating is usually proportional to its thickness."

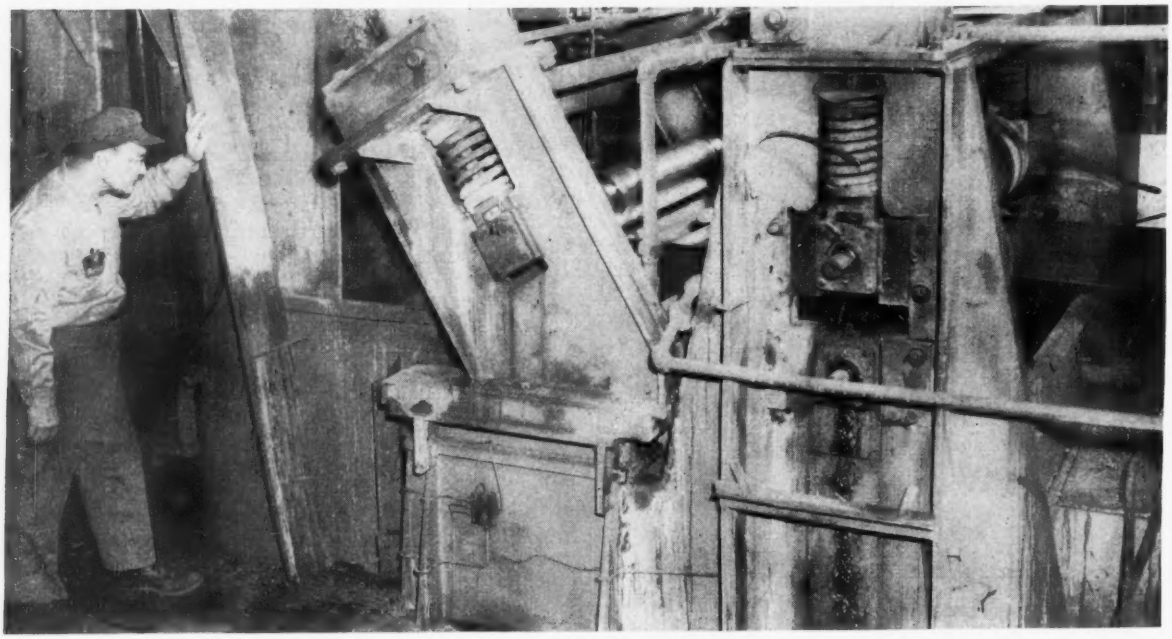
• Additives in the solution insure adequate film thickness and uniform characteristics.

"The bath used to produce the corrosion resistant coating must be more than a water solution of chromic acid or its salts," says Mr. Hartman. "Activators, catalysts, and buffers must be added to keep film formers under control. Acidity must be controlled to maintain the proper balance and reaction rate."

Such a solution, called Iridite 9P-3, was developed by Mr. Hartman and put into use on the four galvanizing lines at Weirton Steel in 1959. Weirton personnel, including A. J. Krombholz, director of research-special projects, Curtis Ard, metallurgist, and John Mayhew, galvanizing department superintendent, helped handle application problems.

The coating method was said to be an immediate success at Weirton—it proved itself superior to previous treatments in wet pack tests, where a stack of test panels was water sprayed and placed on a warm surface to dry.

In tests at another steel company which has since adopted the treatment, samples stood up well in "pressure cooker" tests. (Samples were steamed for 30 minutes.)



Strip emerges from a film forming solution on one of Weirton Steel's galvanizing lines. Coating is completed by rinsing and hot air drying

• **Application of the coating is said to be as easy as: 1. Dip. 2. Rinse. 3. Dry.**

Galvanized material coming off the lines at Weirton is immersed in a solution maintained at 160 to 180° F. Excess solution is removed by running the strip through a spray-rinse roll. Then the material is dried by passing it through a hot air blast and through an electrically heated oven. (A gas heated oven is also said to be suitable for drying the film.)

The Iridite powder purchased by Weirton is said to be easily stored and handled. The solution is made by dissolving the powder in water, in a prescribed proportion. Analysis of the solution every 8 hours indicates the amount of powder required to maintain the right solution strength.

Recirculation and use of the rinse to replenish the dip tank permits safe, economical disposal of water containing chromium compounds.

• **The solution provides a clear, stainfree surface at modest cost and requires minimum maintenance.**

The treatment is said to put a protective film on the galvanized surface, without leaving stains or detracting from the bright appearance, at speeds of 50 to 300 ft a minute. The process never requires modification; the same solution, concentration, temperature, and acidity are suitable on heavy or light gages.

The treatment costs slightly more than some homemade mixtures. But better corrosion protection, and easier handling, control, and maintenance are said to more than make up the price difference.

"Self-purging action in the solution makes it extremely effective in continuous operation," says Weirton's Mr. Ard. "Rejection and removal of reaction products by sedimentation keep the solution fresh and maintain its balance."

At Weirton, the solution hasn't been dumped since initial makeup. The tank is cleaned by decanting (clean solution is pumped into an auxiliary tank every four to six months to remove precipitated impurities, then returned to the line tank.)

Makeup materials are added to bring the solution up to the desired operating level.

Motorized Lifting Device Simplifies Sheet Stacking

Crane positions the unit over stacked packs of galvanized products; a crane follower operates pendant pushbutton controls to open or close the lifting arms

HANDLING of galvanized products is expedited by a motorized, rack and pinion type sheet lifter at Indiana Harbor Works (East Chicago, Ind.), Inland Steel Co.

The lifter, supplied by the Materials Handling Div., Heppenstall Co., New Brighton, Pa., is used to move packs of material to and from a storage area.

• **The crane operator raises and lowers the device with controls in the cab; a crane follower controls lateral movement of the lifting arms.**

The lifter is lowered over a pack with its arms opened wide enough for clearance. When it is positioned, the crane follower operates a pushbutton control, causing the arms to close on the pack and support it. A slip clutch on the motor drive prevents damage to the sheets or the drive mechanism.

When the load is delivered, the crane follower again operates the pushbutton control to open the arms and release the load.

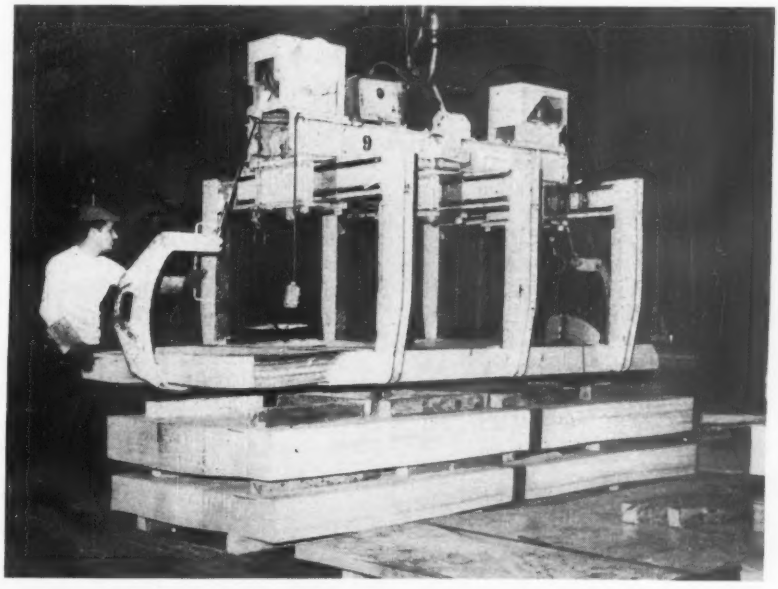
Controls are mounted on each end of the lifter. Hand bars permit the unit to be turned slightly for alignment.

• **The unit handles loads of various weights and widths but requires little headroom.**

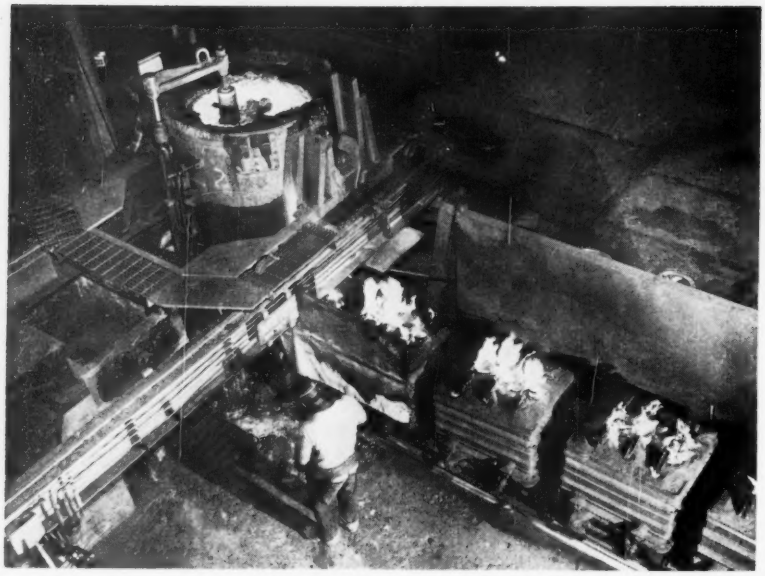
It accommodates packs 18 to 60 in. wide, up to 31 in. high, and weighing up to 10 tons. The lifter is designed for loads up to 120 in. long, but it can handle longer packs when end grabs are used.

Lifting arms move in and out in a straight line. Required clearance: 14 in. on each side of the pack.

Inland uses 4 by 4 in. timbers to separate packs in the stack; that provides ample room for the lifting arms to close.



Pack of sheets, held flat by lifting arms and end grabs, is placed on a stack. The crane follower uses one of the hand bars to align the lifter with the stack



The hydraulically operated pouring unit permits accurate pouring control of molten steel as it flows into the shell molds carried on the conveyor

Foundry Switches Over to Zircon Sand Shell Molds

American Steel Foundries makes the change after success in casting low alloy carbon steel. Castings range from 15 to 300 lb. Parts include brake beams, industrial valves

SUCCESS IN CASTING low alloy carbon steel with the resin bonded, zircon sand, shell mold process has prompted American Steel Foundries, East Chicago, Ind., to drop all its green sand job shop operations.

The company believes it is the first to cast low alloy carbon steel by the zircon shell process and the first to commercially produce shell castings weighing several hundred pounds. The range: 15 to 300 lb.

Of the company's current output, 50 per cent is low alloy, 40 per cent carbon, and 10 per cent special alloy.

• The process, called Amer-Shell, lends itself to mechanization.

The key to the process is in the formulation of the zircon sand and the phenolic resin. Because the sand is costly, a one man salvage system is used. He monitors and controls reclamation, preparation, and distribution via pushbuttons. The system handles 10 tons of sand per hour.

Sand dumped from the casting cars at shakeout points falls on oscillating conveyors in the basement, where it is crushed and reduced. Deposited into a silo, it is fed into a rotary, gas fired kiln to burn off residual resin and carbonaceous matter.

To prepare the sand, 1 ton loads are dumped in a mixer, and measured amounts of liquid resin are added to coat the sand. Other additives are introduced, and the resin coated sand is stored for use.

After passing through a series of screens, the sand is deposited by chute to cone-bottom discharge buckets. A bridge crane carries filled buckets to hoppers over automatic mold and coremaking machines.

• Molds are produced in seven, dump type, shell molding machines.

Three machines produce shells up to 26 x 40 in.; two produce 44 x 55 in. shells; two produce 26 x 80 in. shells. (The last four machines named make up a mechanized unit with complete mold takeoff, molding, carrying, and bonding facilities.)

Pins and arms maneuver to lift the drag and cope off their patterns. As the drag is indexed to the closing station, cores are inserted and adhesive applied to the mating surface of the mold. The mold halves are then clamped together until the residual heat cures the adhesive.

Cores are made of the same resin-coated sand employed for molds. Both hollow and solid cores are used, and several types of machines are employed in their production.

• Pouring practice is tailored to the size of the castings.

Because of their size and weight (325 lb of steel are poured to cast a fifth wheel), molds from the two automatic production lines ride on rail cars to their pouring station. The steel is bottom poured from a ladle mounted on a gantry crane.

The smaller molds go by car conveyor to their station. A stationary unit is employed, though hydraulic cylinders can move the ladle in four directions to position the spout over a mold's pouring basin.

The castings are removed and continue on to be cleaned and heat treated. The sand is salvaged and conveyed to the reclamation system.

• The mechanical features of the process permit accurate duplication and close dimensional control—that cuts down subsequent machining. Surface finish is smoother—120 microinches rms on some parts. In many instances, weight is reduced when parts are redesigned for shell molding.

Typical castings include brake beams, tractor sprockets and rollers, industrial valves, power shovel tooth points, and other wear resistant parts.

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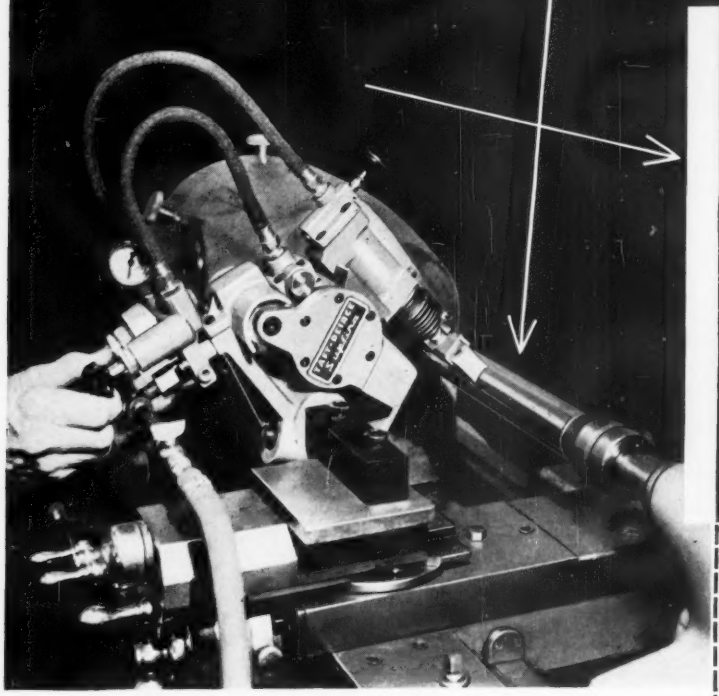
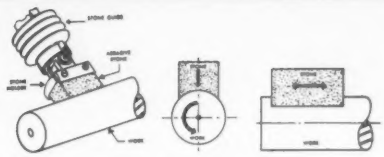
NOW! SIMPLIFIED, LOW-COST CORRECTION OF SURFACE GEOMETRY WITH TAFT-PEIRCE / SUPFINA MICROSTONING



This dramatic "before and after" evidence on a Talyrond chart shows how Microstoning corrected the surface geometry of a die set guide pin. The outside trace shows an average roundness of .00028" as ground. After Microstoning (inside trace), the roundness was improved to an average of .000030".



Here's what happens . . .

Microstoning is a low-pressure, low temperature abrading process using stones of various grit sizes. Stones are placed against the work with light pressure and vibrated from 1900 to 2500 times a minute as the workpiece rotates. The stones shape themselves to the mean radius of curvature, and more pressure is applied at high spots. This produces a fast and simplified correction of surface geometry that is demonstrated graphically by the Talyrond chart above.

Microstoning with Taft-Peirce/Supfina machine tool attachments produces a controlled microinch surface finish, removes cutting tool marks and grinding flats, and dramatically improves roundness.

The unique, patented Supfina design makes this precision surface correction possible. A free-floating piston, driven by compressed air oscillates an abrasive stone at high frequencies against the work — to achieve both desired finish and geometric correction in ONLY ONE OPERATION! All types of metals can be microstoned as well as hard plastics and other nonmetallic materials.

Try Microstoning on your product! Taft-Peirce/Supfina Attachments are low in cost and simple to operate. They can be used on lathes, boring mills, planers and other machines — to produce a precision surface and improve the performance of spindles, sealing rings, metal processing rolls, and bearing surfaces. Microstoning can be used on both flat and round surfaces. Contact your nearest Taft-Peirce Machine Tool Dealer for full information or write direct.

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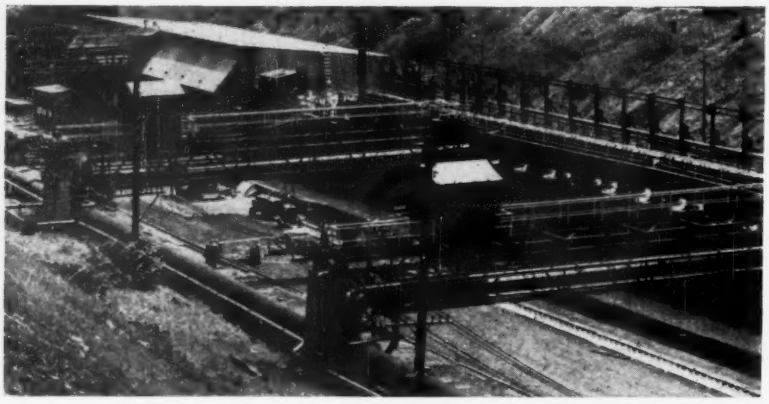
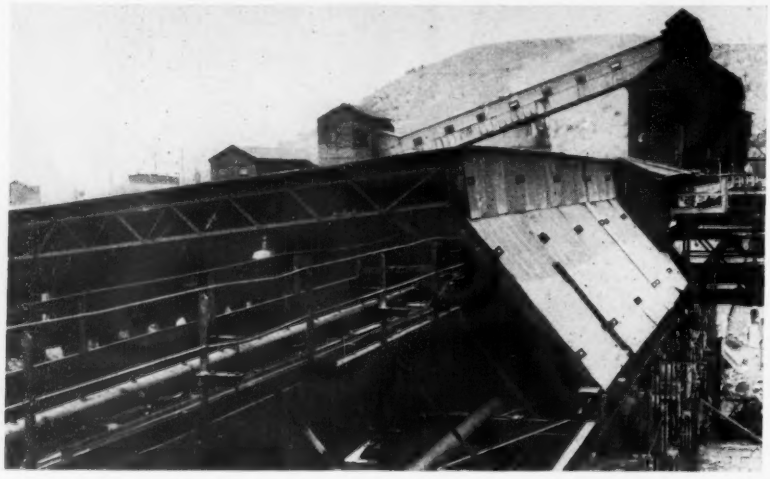


Wheel mounted shelter covers coke ovens only where rebuilding is in progress; when work is finished at one location, the shed is towed to a new position



Tracks on the coke side buckstays and the collector main support the mobile shelter. Long span joists are used in the roof sections

Mobile Shed Reduces Cost Of Coke Oven Rebuilding

It permits piecemeal overhaul of the multioven batteries, protecting workmen and work in progress; it rolls from one station to another on battery structural members

THE COST of rebuilding coke ovens is reduced substantially at the Johnstown (Pa.) plant of Bethlehem Steel Co., by a mobile shed that provides shelter for workers and materials.

The shelter permits piecemeal overhaul of the coke oven battery, protecting only those ovens where work is in progress. It was first used at the plant during the winter of 1959; now it is being employed in overhaul operations on another 44 oven battery at Johnstown.

• The wheel mounted roof and side panel assemblies rest on structural members of the battery.

The basic shed is 40 ft wide by 60 ft long. The roof consists of seven panels—made of long span joists and corrugated roofing. Some sections are removable to permit materials to be brought in.

The roof assembly is mounted on 12 wheels that run on tracks supported by the side buckstays and the collector main. Side panels that extend downward to the coke bench and pusher platform are also wheel mounted.

End sections, with access doors, are built on the job. Made of metal siding, they reach from the shed roof to the oven tops.

• Cables attached to the structure at several points permit it to be moved horizontally with a mobile crane.

The shelter provides room for rebuilding 11 ovens at a time. When work is finished on a group of ovens, they are sealed, and enough heat is supplied by temporary means to keep oven temperature above freezing. The shed is then pulled to its next work station.

In some cases, side panels are removed to clear obstructions as the shelter is moved from one station to another. When all the ovens in a battery have been rebuilt, the shed is removed, and ovens are heated up in the usual manner.

• The mobile unit was chosen in preference to a building that would cover the entire battery, to reduce downtime and rebuilding cost.

Normally, a shelter is built over the entire battery. It is usually 80 to 100 ft wide, and several hundred feet long. It must be well heated and lighted to insure comfortable and efficient working conditions and to protect the work in progress.

But it was noted that the work required to rebuild the Johnstown batteries wouldn't be so extensive as in a new installation or a complete rebuild. Example: Checkerwork could be retained, and about 75 per cent of the division walls were in satisfactory condition.

WIDE FLANGE BEAM AND STRUCTURAL MILLS

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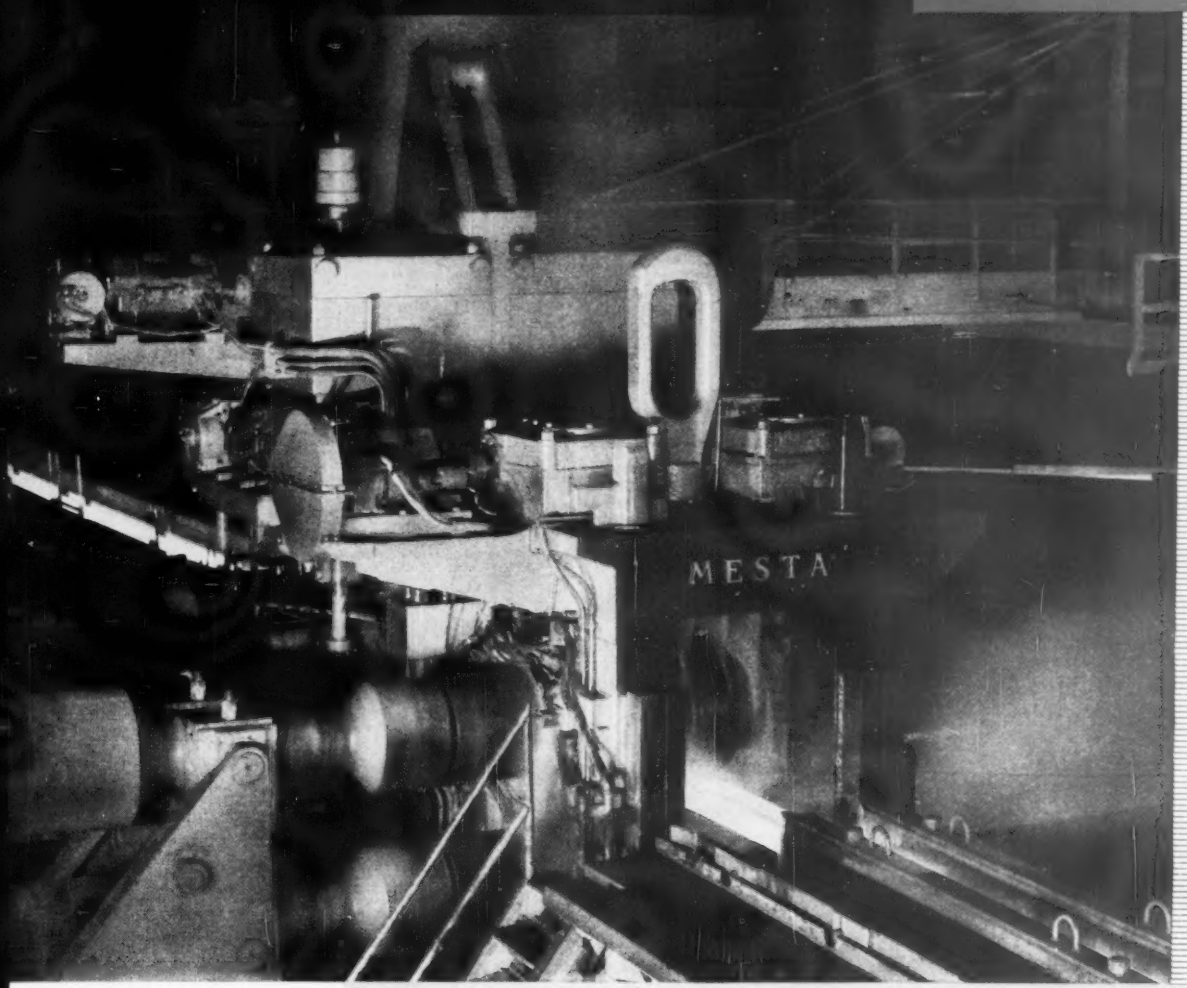

MESTA Universal Structural Mill rolling wide flange beams on the 44" Universal Stand and the 34" Edging Stand at Inland Steel Company, Indiana Harbor Works

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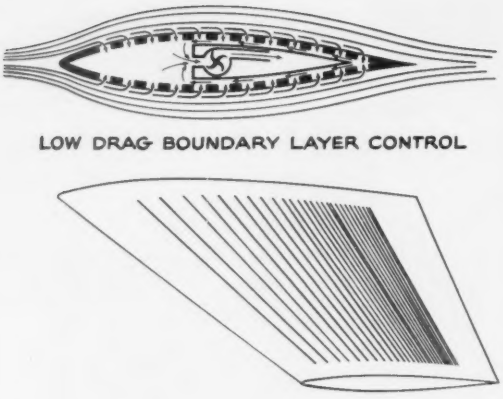


Principle of low drag, boundary layer control: Turbulent air is sucked in through a series of slots, permitting the remaining boundary layer to flow smoothly

Dr. Werner Pfenniger of Northrop points out suction slots on a boundary layer model for one of Norair's wind tunnels. He has spent ten years developing the system

Slots Extend Range of Airplanes

Fabricated into wings and fuselage, they reduce drag caused by air friction. Northrop says removal of turbulent layer next to plane skin can double mileage of fuel load

A LOW DRAG system will soon make it possible for airplanes to fly twice as far with the same fuel load, predicts Northrop Corp., Beverly Hills, Calif.

Designed into wings and fuselage are long, narrow slots that cut drag friction (as much as 80 per cent, the firm claims).

Called low drag, boundary layer control, the system is expected to become a major factor in air transport design. The Air Force apparently thinks so, because it has authorized the spending of $20 million for a three year program to adapt military aircraft.

Planes equipped with the control system cost 10 per cent more to build and 15 per cent more to maintain—costs which are more than offset by large economies in fuel consumption and increases in payload, says Northrop.

• The system cuts drag friction by removing a turbulent air layer.

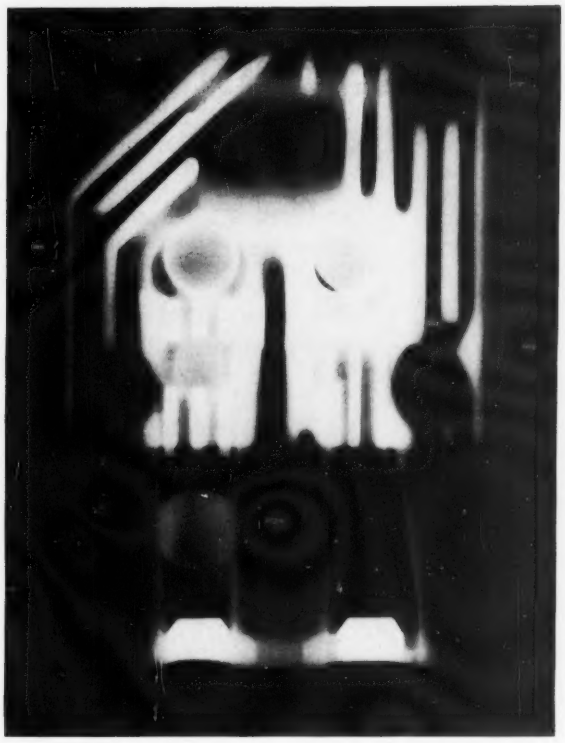
The boundary layer on an airplane in flight lies next to the skin. It flows more slowly than air farther away. At leading edges and for some distance back, the boundary layer moves quite smoothly, but farther back the turbulence becomes great enough to greatly increase air friction.

By inserting slots where the turbulence starts, the turbulence is "sucked in," permitting the rest of the air to flow smoothly past.

Applied to wings and tail sections, the system increases range 50 per cent; added also to the fuselage, range can be doubled. Some hope is held for even greater benefits. During tests on a slotted glove section fitted over part of the wing of a jet F-94 fighter plane, engineers noted that drag was one-fifth the normal value.

• Northrop says regular production equipment, slightly modified, can handle fabrication problems.

Production men say adhesive bonding will be employed in joining various internal parts. Methods have already been developed for making suction holes, plenum chambers, and slots to close tolerances. A slitting head will automatically drill suction holes and mill plenum chambers. Numerically controlled machine tools will be accurate enough to produce necessary adhesive bonding tools and fixtures for joining wing and fuselage parts.



X-ray of cylinder head taken with pair of lead screens

X-ray of cylinder head taken without lead screens

Lead Screens Sharpen 'Seeing' Power of X-rays

X-RAY examination can produce false results. You can increase the flaw detection capacity of the technique by using lead screens to make deeper penetration possible.

Compare the two films above. On the left, the interior of the cylinder head is revealed, and a blowhole appears as a small circular area on the rim of the left valve port; on the right, most of the definition is lost.

Both shots were made with Ilford, Type G, industrial x-ray film, a fast, medium contrast type of medium grain size made by Ilford Inc., New York. The negative showing the defect was produced with the aid of lead screens.

• Absorbent action of lead screens cuts primary radiation loss and checks radiation dispersion to produce a clearer picture with better contrast.

Without the screens, less than 1 per cent of the x-ray energy of primary radiation is absorbed. Clamping the x-ray film between a pair of lead screens (a 0.006 in. lead foil screen in front and a 0.010 in. screen in back) increases the photographic action of the film. Intensification occurs as the film absorbs photoelectrons emitted by the lead under the action of radiation.

Scattered radiation has a longer wave length than primary radiation and is absorbed more readily. The lead screen on the bottom absorbs the radiation scattered back from the structures supporting the film holder, or from nearby objects which are struck by the transmitted beams. The effect is to intensify the primary radiation by diminishing the over-all haziness produced by scattered radiation.

• Good contact between the film and the screens and clean surfaces are essential for clarity.

The lead screens do not significantly affect the definition of the image as long as close contact with the film is maintained. The radiation and photoelectrons cannot scatter to produce a blurry image.

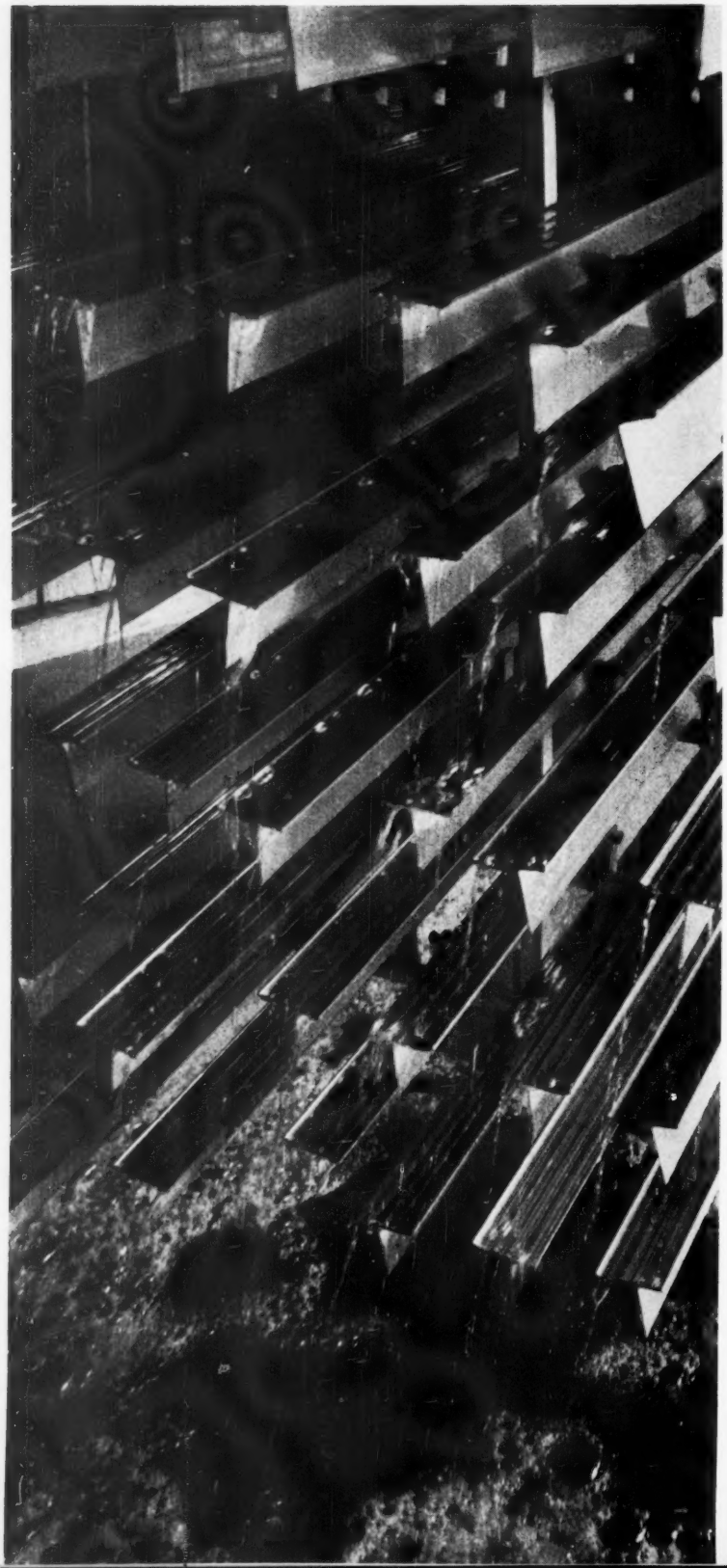
Electrons cause most of the intensifying action of lead screens. Because of high electron absorption in light materials, the surface of lead foil screens adjacent to the film must be kept free from foreign matter.

• X-ray testing can be employed in many areas. One growing use is in the repair and maintenance of transportation equipment.

Aircraft parts can be inspected for hidden flaws or damage.

Casting defects that can be found include: Cracks, hot tears, stress cracks, gas holes, and misruns. Weld defects that can be determined include: Nonmetallic inclusions, lack of fusion, porosity, and cracks.

Bright Dip Features Fume Control



Technique for aluminum extrusions is also said to offer closer control, higher part quality, and less chemical loss. It includes new formula and monitoring device

EASIER control, higher part quality, less chemical loss, and practically no fuming—those are the advantages of a technique for bright dipping aluminum just developed by Monsanto Chemical Co., St. Louis, and tested at Aluminum Extrusions Inc., Charlotte, Mich.

Principal elements: A new chemical formula (NFB 85, a replacement for phosphoric acid) containing inhibitors which eliminate the nitric oxide fume problem; and an electrical monitoring device which greatly simplifies bath control.

Aluminum parts are leveled uniformly in the new bath—a factor in color control during later dips. Operators no longer need to dump whole vats of worn-out or out-of-control chemicals.

Other results: A 10 to 30 per cent drop in material costs and a 75 per cent reduction in rejected material.

• It takes eight steps to brighten and finish aluminum extrusions. Quality depends on close control.

Aluminum Extrusions Inc. processes about 150,000 pieces of extrusions a week on a 24 hour per day schedule. Its product mix includes parts for building products (30 per cent), home appliances (25 per cent), furniture (18 per cent), commercial refrigeration (8 per cent), business and vending machinery (8 per cent), and transportation items (3 per cent).

A bright dip is about 70 per cent phosphoric acid and 3 per cent ni-

Extrusions like these react vigorously with acid dipping solution. Previous formulas produced clouds of choking, nitric oxide fumes; new solution eliminates the problem

Source: Arthur Siegel, Chicago.

tric, the rest consisting of dissolved aluminum phosphate and water. Temperature runs about 200° F.

Aluminum extrusions are fabricated, deburred, and cleaned before being dipped in the bright bath. When the aluminum is dipped, the acid attacks the surface, hitting the high spots more heavily, leaving the whole surface more nearly level. Appearance is much brighter than raw stock and approaches that of some mechanically finished pieces. The process is being used increasingly for the trim parts on a wide variety of products.

Bright dipping is followed by rinsing, anodizing, rinsing, dyeing (if required), a "set" dip, and a final rinse before drying.

As dipping proceeds, the aluminum neutralizes the acids. Careful control of replenishers assures uniform appearance of finished products.

Aluminum Extrusions Inc. creates its own markets with ideas like this desk unit, part of a system of modular furniture called OMNI. Aluminum parts in the units are bright dipped

• An electronic device developed by Monsanto engineers monitors the bath condition every few seconds. When it is in line with set factors, a green light stays on; a red light and a buzzer indicate that nitric acid content is below desired levels, and that replenishing chemicals are required. The system can detect changes of less than 0.2 per cent in nitric acid concentrations.

Here's how the device works: A long glass probe carries electrical conductors and two electrodes beneath the bath surface. A fixed current passes between the electrodes at all times. When bath conditions are proper, little voltage is required to maintain the current. As soon as the nitric acid content of the bath falls below a set level, the voltage increases, switching the control from green condition to red. The operator then adds sufficient makeup to the bath to bring it back to the green condition.

At intervals, the operator measures bath viscosity and density. The measurements are used to determine how much water and NFB 85 are needed to maintain the bath at proper operating levels.

The procedure takes only 15 minutes vs. 4 to 6 hours a complete chemical analysis formerly required. Under the old system, an entire day's production could be lost before corrections were made.

Technician prepares to adjust bath composition aided by automatic control unit (right) which will change from "add acid" indication to "normal" when proper composition has been reached

• Closer control means less wasted chemicals, fewer rejected batches of extrusions.

Many of the previous techniques depended on the skill and knowledge of an operator. While control was effective, chemicals were often wasted when icing occurred (the bath freezes when it contains too much reaction products of aluminum and bath acids). In addi-

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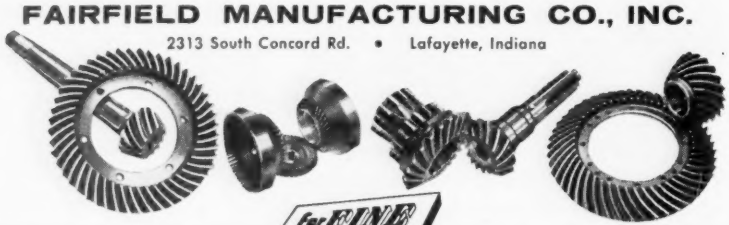

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tion, slight variations can bring wide changes in the anodized surface and the various dyes used for coloring. Off-color batches had to be rejected, or reprocessed.

Quality has improved as a result of closer control. The operating people at Aluminum Extrusions have found that when dipping quality is high the rest of the plant automatically gears itself to the higher level.

"We have carefully figured costs," says Carl Henry, vice president of Aluminum Extrusions. "We spend about $8000 a month to run the finishing baths (including labor). We expect to save 10 to 30 per cent of our present chemical costs by switching to the new Monsanto material."

• The anticipated increase in production would have necessitated a $27,000 fume exhaust and washing system to eliminate nitric oxide fumes.

During the dipping, aluminum reacts vigorously with the acids. One of the products of the reaction is reddish-brown nitric oxide gas that is unpleasant, corrosive, a source of serious air pollution.

"We had planned to install the air cleaner. Instead, we'll expand our present system with the money we saved," states Mr. Henry.

The editors of STEEL witnessed the old and new bath formulas in operation. The new bath boiled just as vigorously as the old but only small puffs of nitric oxide appeared.

• What's ahead? Aluminum Extrusions outlines its plans and aims.

"We believe that appliances of tomorrow will have more bright dipped aluminum for trim," states William Dunlap, Aluminum Extrusions' president. He believes that growth of bright dipping has been stymied by control problems.

The company is concentrating on new ways to process its own extrusions. It feels that the market for pure extrusions is too tight. Combining its own production facilities with its own fabricating and finishing will greatly improve the profit picture, predict Messrs. Henry and Dunlap.

The company was started 13 years ago with $15,000 capital. This year, the firm expects to gross $8 million.

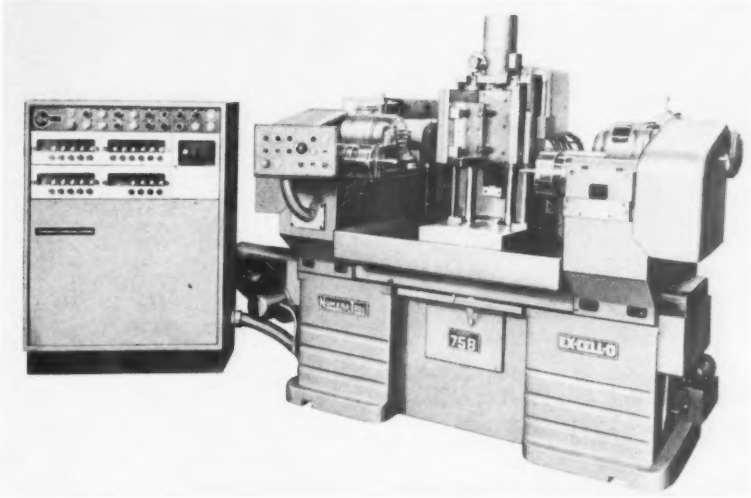
Tape Controlled Unit Selects Bore Size, Location

PRECISION boring of holes with various diameters and in selected locations is done automatically and in sequence on the Numera-Trol.

The unit positions the work and adjusts the boring tool to the required hole diameter while the spindle is operating.

Hole diameter accuracy is held within 0.0005 in.; center locations are held within 0.0002 in. of true position; and boring depth is held within ±0.0005 in. An incremental tape positioning system provides control in all axes to increments of 0.0001 in. Programing of infinite boring diameters is possible within a 1 in. range.

For further information, *write* Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.



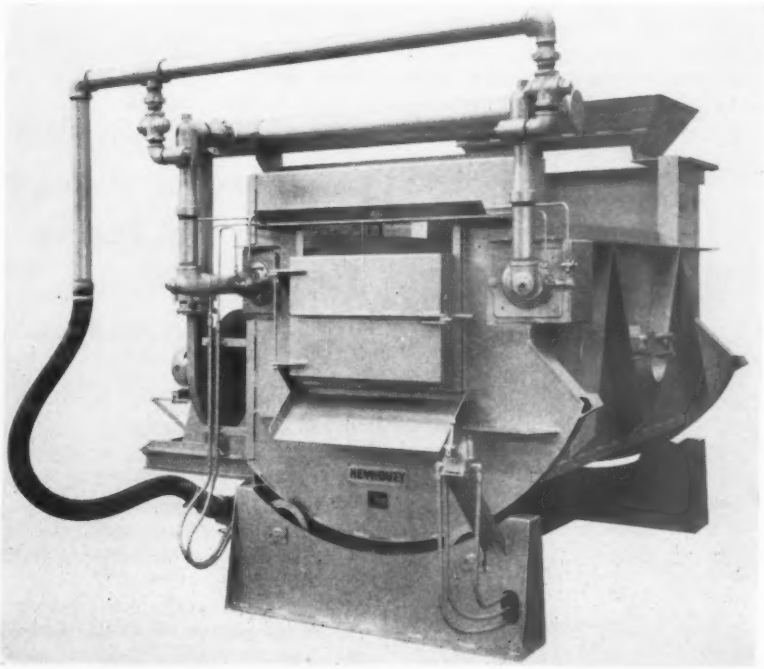
Reverberatory Furnaces Melt, Hold Aluminum

THREE reverbatory furnaces for melting and holding aluminum are available: Gas, oil, or combination models. They're designed for use in sandcasting, diecasting, and permanent mold plants.

Convenient location of charging chutes speeds hopper loading. Direct firing provides maximum melting under controlled combustion conditions. Melting capacity ranges from 150 to 3000 lb of aluminum an hour with bath capacities ranging from 650 to 5000 lb of molten aluminum. Higher capacity furnaces can be specified.

Convenient cleanout doors provide easy access to furnace interiors for drossing, alloying, fluxing, cleaning, and maintenance.

Type MCB furnaces are dipout units with wells on one or both sides (depending on requirements and furnace size). The Type DSB unit is constructed with a front dipout. A hand operated, hydraulic ram tilts the furnace forward to



make dipping and emptying easier. Hevi-Duty, Type SWB, cradle tilting furnaces make possible fast melting and distribution. They are particularly useful as centralized melters. Any amount of aluminum up to furnace capacity can be poured with controlled tilting. Direct pouring from a side spout into transfer ladles allows rapid metal movement to casting points.

All furnaces include burner equipment, gas pilots, firebrick or silicon carbide linings, and centrifugal blowers. Combustion safeguards and automatic metal temperature controls can be provided.

For further information, *write* Hevi-Duty Electric Co., Milwaukee 1, Wis.

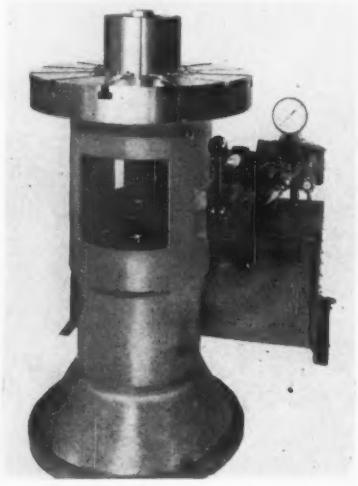
Hydraulic Expanding Units, Presses Are Improved

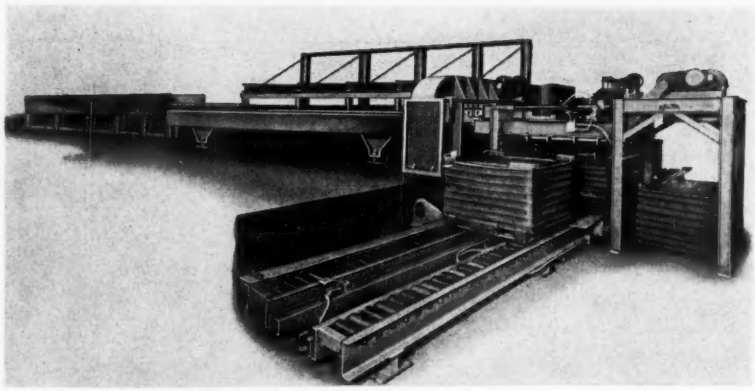
TWO hydraulic expanding machines (Model E-62 and E-93) have been developed by Greenerd. Maximum pull of the ram corresponds with the figures in the model number.

Both units have 30 in. diameter tables. The 12 segment master jaws are 6 in. high. Minimum diameter is 7.572 in., true diameter 9 in., and maximum diameter 9.158 in.

Other developments include a self-contained, 4 ton, hydraulic press; a 15 ton press with straightening table and variable ram pressure control; a guided platen, 40 ton, hydraulic press; and a ratchet type arbor press.

For further information, *write* Greenerd Arbor Press Co., Nashua, N. H.





Handling Setup for Shear Is Automatic

A MATERIAL HANDLING system for a bar shear features four automatic operations—feeding, bar take away, container loading, and conveyor handling.

The entire operation is interlocked mechanically and electrically (to synchronize components) for continuous operation at maximum capacity.

The feeding system has a hopper, live roll conveyor for receiving bundles from an overhead crane (outdoors). An intermediate conveyor brings bundles indoors from the hopper conveyor to an unscrambler which conveys bars transversely onto a live V-roll conveyor.

Next, the material moves to the shear. A take away conveyor loads the cut bars into a container mounted on a shuttling conveyor, which helps to form level rows of bars in the container. When the container is full, it is pushed onto a floor storage conveyor where it can be carried by lift truck to the process or storage area. An empty container is automatically pushed forward to replace the full one. No production time is lost.

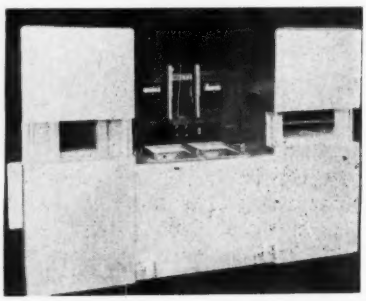
For further information, *write* Spurgeon Co., 1330 Hilton Rd., Ferndale 20, Mich.

Doors on Heat Treating Furnace Air Operated

AIR cylinders, controlled by pedals, operate the righthand and lefthand doors on the Model CH heat treating furnace made by Waltz. It was designed for convenience of operators carrying parts to be loaded.

The furnace is equipped with electronic, automatic, control instruments and electrically operated, control valves. Temperature range of the heating furnace: 1000 to 2400° F. The inside of the firing chamber is 12 in. wide, 10 in. high, and 18 in. deep.

The tempering oven (range: 250 to 1100° F) is a recirculating type with constant, automatic, temperature control. It's alloy steel lined and has



a perforated shelf. It is 21 in. wide, 10 in. high, and 18 in. deep.

Two quench tanks for oil and water are located below the center control panel.

For further information, *write* Dept. 9, Waltz Furnace Co., 1901 Symmes St., Cincinnati 6, Ohio.

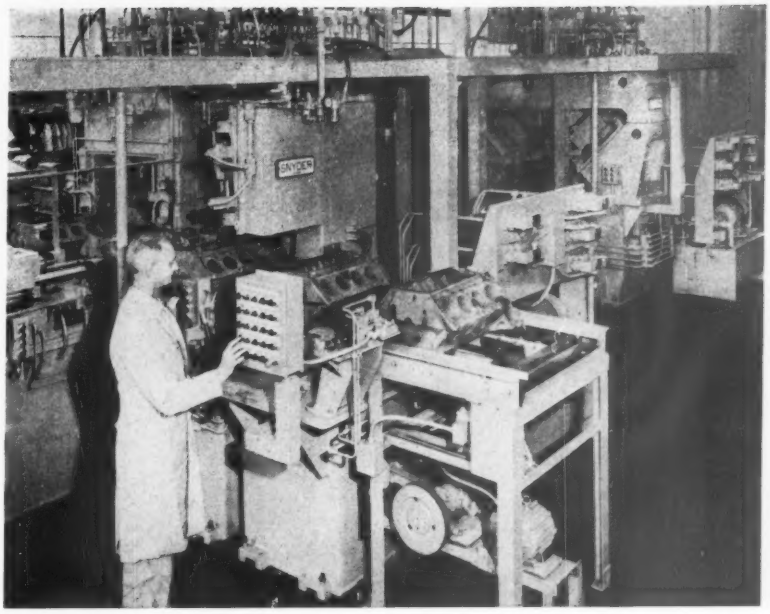
Positioning Controlled by Point to Point Unit

ACCURACY to ±0.001 in. and repeat accuracy to ±0.0005 in. are provided in a point to point positioning control system called Rapac. It can direct a wide variety of machine tools, including drill presses and boring mills, and is also suitable for multiple axis control.

A linear transducer indicates the direction of travel toward the desired positioning point at all times. The unit does not require special machine designs. Components and encapsulated building block circuitry are used wherever possible to reduce and simplify maintenance.

Rapac is available as a complete system, or in components for measuring subsystems, drive subsystems, and data decoding subsystems.

For further information, *write* Dept. SA, Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.



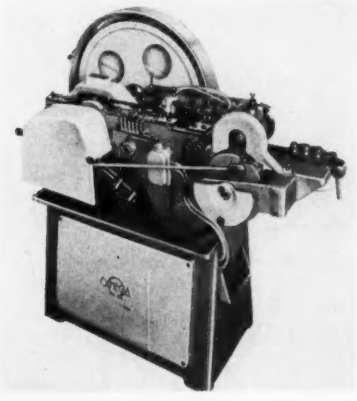
AIR HAMMERS IN THIS UNIT REPLACE MANUAL LABOR in removing fins from engine block castings. The transfer type machine handles 240 castings an hour at 100 per cent efficiency. At the end of the line, a marking unit performs an in-process gaging function. If any of the defining units does not travel its full distance (indicating a reject), the part is marked before it leaves the line. For further information, **write** Snyder Corp., 3400 E. Lafayette, Detroit 7, Mich.

Cold Heading Machine Makes Long, Thin Parts

AN OPEN die, precision, cold heading machine is 50 per cent heavier than the previous model. The unit makes long, thin parts such as lead wires, pins, or rivets.

The unit is equipped with a motor and V-belt drive. It can produce 60, 90, or 110 pieces a minute on parts up to 2⅜ in. long with a nominal wire capacity of 0.020 in. to 0.090 in. (diameter).

The unit has a nine roll straightener for fine wire up to 0.036 in. and an auxiliary, five roll straightener for wire sizes of 0.036 to 0.090 in.



A one shot lubrication system and a set of prototype tools are included as standard equipment.

For further information, *write* REM Sales Inc., a subsidiary of Robert E. Morris Co., Box 41, West Hartford, Conn.

Alignment Assured on Hydraulic Surface Grinder

MICROINCH finish at production speeds is a characteristic of a hydraulic No. 206 feed surface grinder. It's built around a solid, one piece column and base to assure alignment between vertical head ways and cross travel ways.

The amount of cross feed is controlled from a panel on the saddle front. It's variable up to ¼ in. per table reversal. A Vickers vane type pump and a Gallmeyer & Livingston control valve give an infinite number of longitudinal table speeds up to 110 ft per minute. A variable speed, continuous cross feed provides dressing or quick positioning. The saddle can be automatically reversed at any predetermined point by adjustable dogs mounted on the side of the base.

Regular equipment includes an 8 in. grinding wheel with 13 in. capacity under the wheel and 14 in. of vertical movement.

For further information, *write* Gallmeyer & Livingston Co., 430 Straight Ave. S. W., Grand Rapids 2, Mich.

Tape Recordings, Slides Guide Component Assembly

INCREASED productivity, reduced assembly defects, and improved production planning are cited for an assembly technique using audio and visual aids. In the ACS system, an individual worker builds an entire electronic or mechanical unit at a work station equipped with slide projected and tape recorded instructions.

The time standard for each assembly step is built into the sound

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Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

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Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

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Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

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West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

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NEW PRODUCTS and equipment

tape. Instructions are tailored to the worker's individual proficiency. The system can be expanded to accommodate changes and improvements in material control methods.

For further information, *write* Applied Communication Systems, 259 E. Erie St., Chicago 11, Ill.

Alkaline Cleaner Removes Light Rust

AN ALKALINE cleaner (Surj) combines heavy duty cleaning abilities with light rust removing properties for use electrolytically or as a soak tank cleaner.

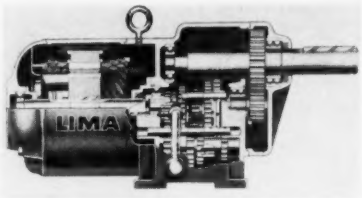
No extra equipment is needed. The cleaner can be used in hard or soft water in mild steel tanks.

For further information, *write* Turco Products Inc., 24600 S. Main St., Wilmington, Calif.

Revamped Gearshift Drive Handles Heavy Loads

LOWER outputshaft speeds on the redesigned Lima gearshift drive can handle heavy load requirements. The unit (Type R3C) has an extra-heavy alloy steel outputshaft mounted on widely spaced ball bearings to provide rigid support for overhung loads.

Lever movement provides four



gear changes. The unit is designed to operate on polyphase, ac power supplies of standard frequencies (25-50-60 cycles) and voltages below 600.

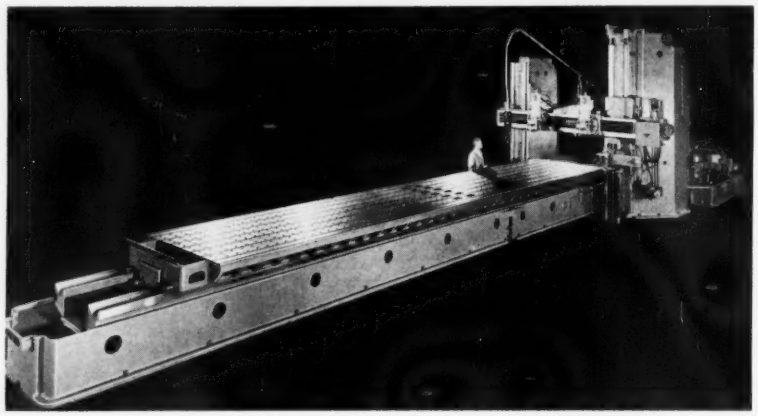
For further information, *write* Dept. 149, Lima Electric Motor Co. Inc., Lima, Ohio.

Building Block Design Used in Contact Blocks

COMPACT, single circuit, contact blocks of building block design with convertible contacts are featured on a line of Type R Series pushbutton control units and selector switches.

The blocks can be mounted to meet specified contact arrangements. The maker says the design can reduce basic costs, eliminate unwanted circuit connections, save installation time, and minimize space requirements.

With convertible terminals, the



A PENDANT CONTROL OPERATES THE 34 FT TABLE WORKING SURFACE on this Hy-Draulic openside planer. Also pendant controlled is speed range selection, infinite cutting speed adjustments, tool head positioning, feed or traverse control, and main motor and rail elevation. The unit has 72 in. under the bridge and 72 in. between the columns. For further information, **write** Rockford Machine Tool Co., Rockford, Ill.

Liquid flow through a cross section of a Malleable differential carrier.

For Performance-Tested Dependability...Use Malleable

Molten metal flows evenly into all parts of the mold, then solidifies into pre-shaped parts with uniformly dependable properties throughout. Malleable iron castings will stand up under extremes of tension, impact, torsion, shear, fatigue, wear, heat, cold, and corrosion. They also offer maximum economy, are easy to work, and are versatile enough for parts ranging from a few ounces to hundreds of pounds.

The more manufacturers know about Malleable castings, the more they use Malleable to improve quality and increase profits. Get the full story on Malleable . . . Contact any of the progressive companies that display this symbol —

MEMBER
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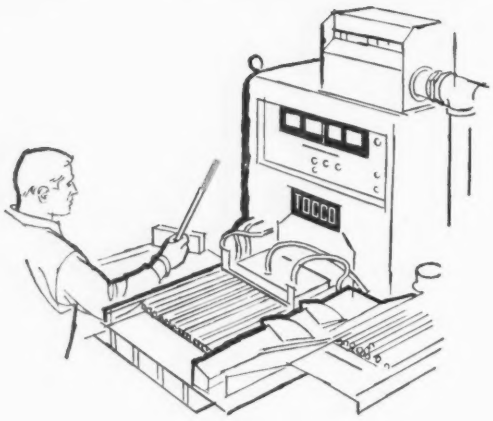
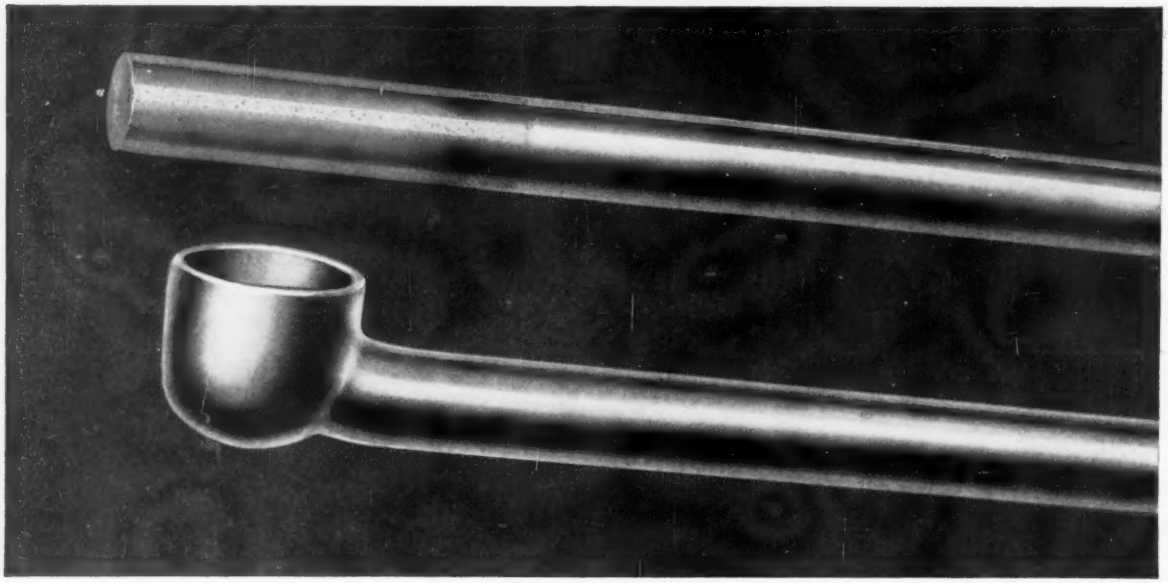
For details on Malleable's uniformity and reliability contact any company listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.



Heating Costs *Cut In Half*

with TOCCO* *Induction Heating*



Engineers at Thompson Products Michigan Division of Thompson RamoWooldridge, Inc. recently changed from gas-fired furnaces to fully automatic TOCCO. Application: heating for forging of automotive tie rods. Result: a substantial reduction in direct labor costs, saving thousands of dollars a year on this heating for forging operation. *Annual savings actually amortize the cost of the TOCCO installation in about one year.*

The automotive tie rod shown here is only one of over 500 parts heated for forging in Thompson's new, modern forge plant. *Every one of these parts is heated with TOCCO equipment.*

If *your* manufacturing operations require heating for forging, heat treating, brazing, soldering or melting, it will pay you to investigate TOCCO as a sound method of increasing production and lowering costs.

THE OHIO CRANKSHAFT COMPANY

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Please send copy of "Typical Results of TOCCO Induction Heating for Forging and Forming".

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units can be quickly changed from normally open to normally closed without use of additional parts or special tools.

For further information, *write* Mackworth Rees Inc., 1573 E. Forest Ave., Detroit 7, Mich.

Gas Pressure Regulators Can Take Rough Usage

TWO STAGE, gas pressure regulators without glass covered gages are available for continuous, quality performance under rough usage.

Delivery pressure is set with a micrometer type indicator. The gages are equipped with a cylinder pressure indicator which is visible at the top of the regulator and protected from damage by a forged brass housing. The units include an oxygen regulator with a 100 psi maximum work pressure and two acetylene regulators with a maximum work pressure of 15 psi. You can get kits to convert gage regulators (in the same class) to gageless regulators.

The same company has also brought out a new manual, gas shielded, metal arc, welding gun. The gun and controls are designed for light to heavy fabrication where numerous short welds, off the ground welding, or emergency repairs are necessary.

For further information, *write* Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

Unit Drills, Taps, Reams, Counterbores, and Faces

DRILLING, tapping, reaming, counterboring, and facing can be done automatically by the American, six spindle, Model AA Turretdex. Its two axis, ultraprecision positioning table moves 20 x 30 in. and positions to ±0.00025 in.

The machine has preselected speeds, feeds, and tapping cycle.

For further information, *write* American Tool Works Co., Pearl at Eggleston Ave., Cincinnati 2, Ohio.

Positioning System Easy to Program

"SO SIMPLE to program your secretary can do it." That's the way Micro-Path Inc. describes its 801 numerically controlled, point to point positioning system.

Accurate to 0.0001 in., the system can be used for any positioning application. As many axes as required can be provided. By adding an interpolator, it can be expanded into a complete contour system.

It is operated by punched paper tape prepared on a standard Flexowriter or other BCD unit. Transistors in the electronic console perform all switching functions and logic.

Single parts can be produced without taped programs by setting up manual controls for each position. Parts produced by tape programs can be amended, adding new hole positions or permitting individual deviations.

The system includes a two axis, positioning table which is built for precision, point to point and continuous path uses. The table is driven by hydraulic rotary motors attached to ball lead screws. The motors are controlled by hydraulic servovalves responding to electronic commands.

Other highlights of the system include high locating speed, direct decimal readout, and floating zero reference point.

For further information, *write* Micro-Path Inc., a subsidiary of United Industrial Corp., 10321 Anza Ave., Los Angeles 45, Calif.

Ultrasonic Impact Grinder Does Precision Work

AN AREA up to 1⅜ in. in diameter can be machined by the Model 2-333 ultrasonic impact grinder. The unit was designed for precision machining of semiconductor and other electronic devices. It can also be used for general purpose work, including cleaning and soldering.

The 300 watt, magnetostrictive transducer is air cooled. It's an insert type (the coil or the transducer can be removed without dis-

A Complete Range of Heat and Corrosion Resistant Steel Castings . . .

Unitcast's 40 years experience as one of the nation's most progressive steel founders, now expands its proved engineering and production facilities to serve the "stainless" market.

Typical of such requirements is illustrated by the fluid pump chamber that pressurizes corrosive liquid. Cast to specification CF-8 (A.I.S.I. 308), this casting will provide long, corrosion-free service to improve the product dependability.

Industrial users of Unitcast's advanced methods in stainless steel as typified by manufacturers that produce oil well equipment, special valves, pumps, compressors and turbines, food processing machinery, dies and fixtures, and heat treating equipment.

An analysis of your needs incurs no obligation on your part. Our technical staff may provide the answer to your problem. Get in touch with us today!

UNITCAST CORPORATION, Steel Foundry Division, Toledo 9, Ohio
In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec

Unitcast

SPECIFICATION STEEL CASTINGS

NEW PRODUCTS and equipment

turbing the other).

For further information, *write* Commercial Apparatus & Systems Div., Raytheon Co., 1415 Providence Turnpike, Norwood, Mass.

Abrasive Belt Machine Handles Small Jobs

CLEAN cuts on many types of materials and surfaces can be made by a small, portable abrasive belt machine. The unit, called the Pee-Wee, deburrs, removes seams, and polishes small parts quickly and economically.

The unit has a cast iron frame and has double shielded ball bearings (rated at 2500 hours' continuous service) at the pulleys.

A 6 x 6 in. cast iron table supports the workpiece. The table can be tilted forward 70 degrees and

locked in position at any angle for accurate beveling. The unit measures 22 x 16 x 8 in.

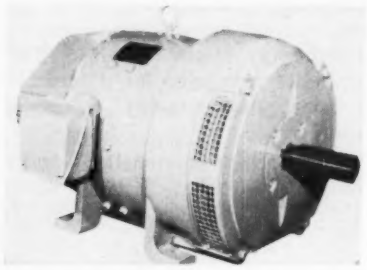
For further information, *write* Rofran Co., 107 Chandler Ave., Linden, N. J.

Generators, dc Motors Designed for Drives

TOTALLY enclosed dc motors and generators are designed for constant speed drives and drives with fast, wide speed changes and reversals,

automatic control, or close regulation. The line includes totally enclosed, fan cooled, and totally enclosed, nonventilated machines in industrial and explosion proof construction.

The motors are rated from ½ to 60 hp at 300 to 3500 rpm. The



generators have ratings from ¾ to 40 kw at 850 to 3450 rpm.

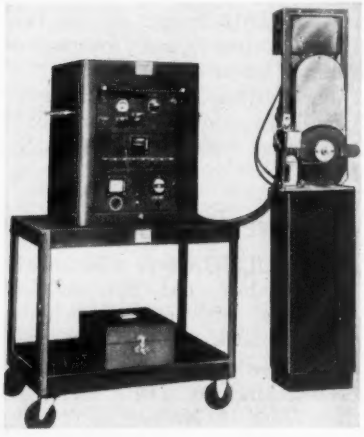
Design features include a high temperature silicone insulation system and a high capacity ventilation system with blowers and heat exchanger mounted at the shaft end. Principle advantages cited: Faster response, stability, and increased insulation life; armature inertia has been decreased 75 per cent.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Unit Checks Steel Wire For Open Surface Flaws

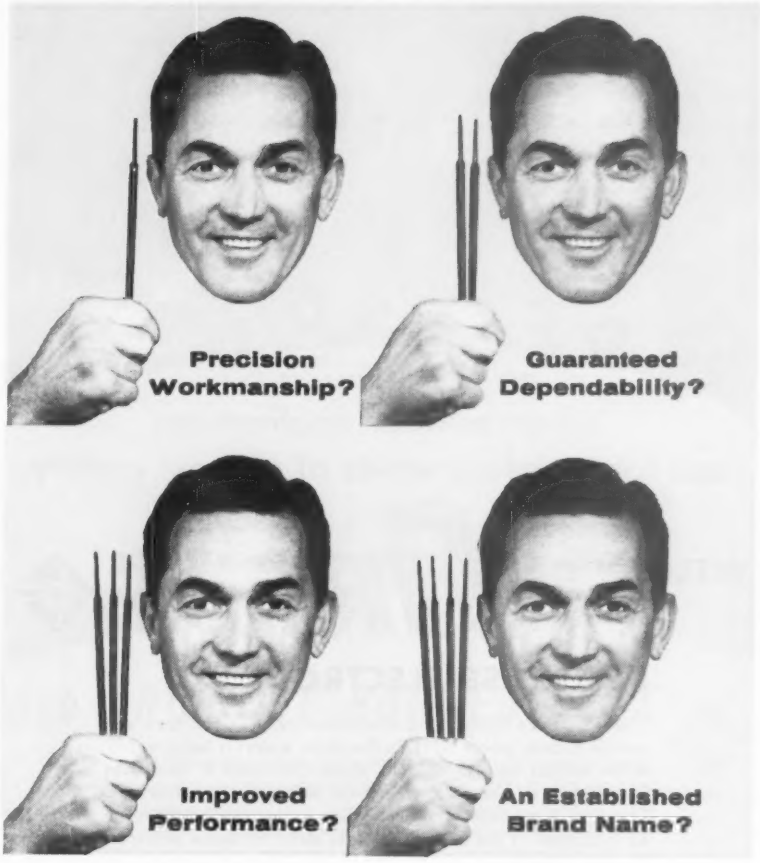
OPEN surface flaws 0.004 in. or deeper can be detected in magnetic or nonmagnetic cold drawn steel coiled wire up to 1 in. in diameter by the Rototester.

The rotating head mechanism uses the eddy current technique. It



VICTOR Yellow Tang Quality Files...

4 good reasons for you to buy...



Now you can get VICTOR "Yellow Tang" quality files from your local authorized VICTOR distributor, the man you depend upon for other VICTOR metal cutting products.

He stocks VICTOR "Yellow Tang" quality files with factory assurance that every "Yellow Tang" File is individually checked and tested to be sure you'll be a satisfied customer.

Metal Cutting Headquarters is right near you. Call your VICTOR distributor. 2940

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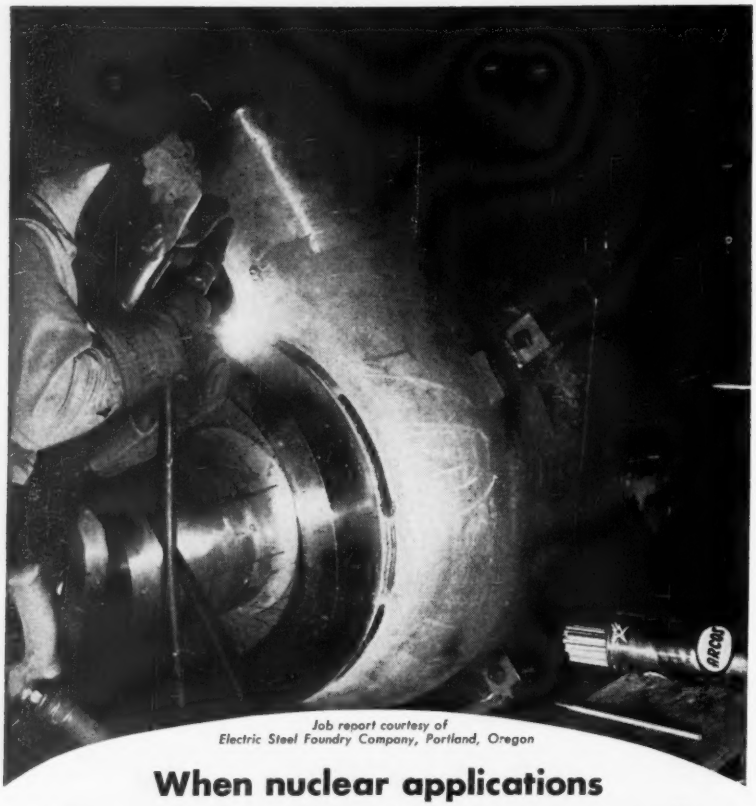


Job report courtesy of
Electric Steel Foundry Company, Portland, Oregon

When nuclear applications call for stainless welds of highest quality

WELD WITH ARCOS

STAINLESS ELECTRODES

This is part of a 3900 lb. stainless pump-volute casting for a submarine nuclear power plant. In the photo, a skirt is being welded to the casting using 5/32" dia. Arcos Chromend K Electrodes. To minimize stresses, a step-back and skip procedure was used. These welds conformed to Class I Navy radiographic standards—an indication of the dependability of standard Arcos electrodes for your stainless welding needs. ARCOS CORPORATION, 1500 South 50th St., Philadelphia 43, Pa.

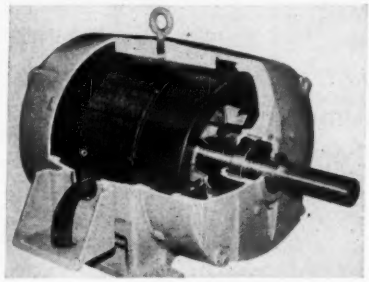
mounts on the draw block and rotates around the drawn wire as it emerges from the die. At a production speed of 200 fpm, flaws 1 in. and longer are detected. Flaws are indicated by a light, an audio signal, and on an oscilloscope screen. Paint spray marks the area. The unit has provisions for a recorder and a predetermined electronic counter.

For further information, *write* Magnetic Analysis Corp., 42-44 12th St., Long Island City, N. Y.

Motors Encapsulated In Epoxy Compound

A LINE of encapsulated ac motors in two or three phase versions is rated from 1 through 125 hp. An epoxy compound (Howellseal) is applied under vacuum to surround each wire in slots and at coil ends to produce a solid, voidfree mass.

The manufacturer says the line provides open motor performance for



applications usually requiring enclosed motors because of exposure to heat, contaminants, shock, or vibration. They're available in A, B, C, and D NEMA designs for one, two, three, or four speed, constant or variable torque operation.

For further information, *write* Howell Electric Motors Co., 16316 W. Seven Mile Rd., Detroit 35, Mich.

Adhesive Resists Heat

AN EMULSION type adhesive (E-2554-B) has good heat resistant properties. It's easily machined, nonflammable, and water miscible.

For further information, *write* Arabol Mfg. Co., 110 E. 42nd St., New York 17, N. Y.

NEW literature

Write directly to the company for a copy

Georgia Casting Study

A 33 page brochure answers questions about opportunities in light metal castings in Georgia. Market and consumption by industry are discussed. Georgia Department of Commerce, 100 State Capitol, Atlanta, Ga.

Corrosion Data Chart

A chart showing the corrosive effects of almost 400 different materials on 16 types of metals is presented in Technical Service Bulletin No. 101. Nooter Corp., 1400 S. Third St., St. Louis 66, Mo.

High Strength Bronzes

Specifications of nine special wear and corrosion resistant copper base alloys are described in a 20 page bulletin. Ask for "Ampco Alloy Specifications." Ampco Metal Inc., Box 2004, Milwaukee 1, Wis.

Small Diameter Tubing

Another edition of Superior Tube's "Super Alloy Tubing" selection guide has been published as Bulletin 71. It covers high strength alloys for tubing service up to 1650° F. Alloy properties are discussed and presented graphically. Superior Tube Co., 1585 Germantown Ave., Norristown, Pa.

Spotwelding

An eight page brochure describes procedures and equipment for spotwelding hardenable steels. Weld quality is classified and data charts summarize welding schedules for various steels. Taylor-Winfield Corp., 1048 Mahoning Ave., Warren, Ohio.

NEW BOOKS

ASTM Standards on Light Metals and Alloys, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 368 pages, $4.50

Fifteen of the 57 standards in the book are revised or have had their status changed since the previous edition. Among three new standards is one for aluminum alloy pipe for gas and oil transmission. A test method for electrical conductivity using eddy current procedures is also included. In addition to general test methods, there is also a standard for electroplating on aluminum alloys.

Practical Welding Repairs, C. G. Bainbridge, Temple Press Ltd., Bowling Green Lane, London E.C. 1, England, 128 pages, $2.10

Repair welding in castings, sheet metal, and the rebuilding of worn parts are discussed in detail. The chapters cover such things as properties of metals, welding wrought metals, care of equipment, and operating safety.

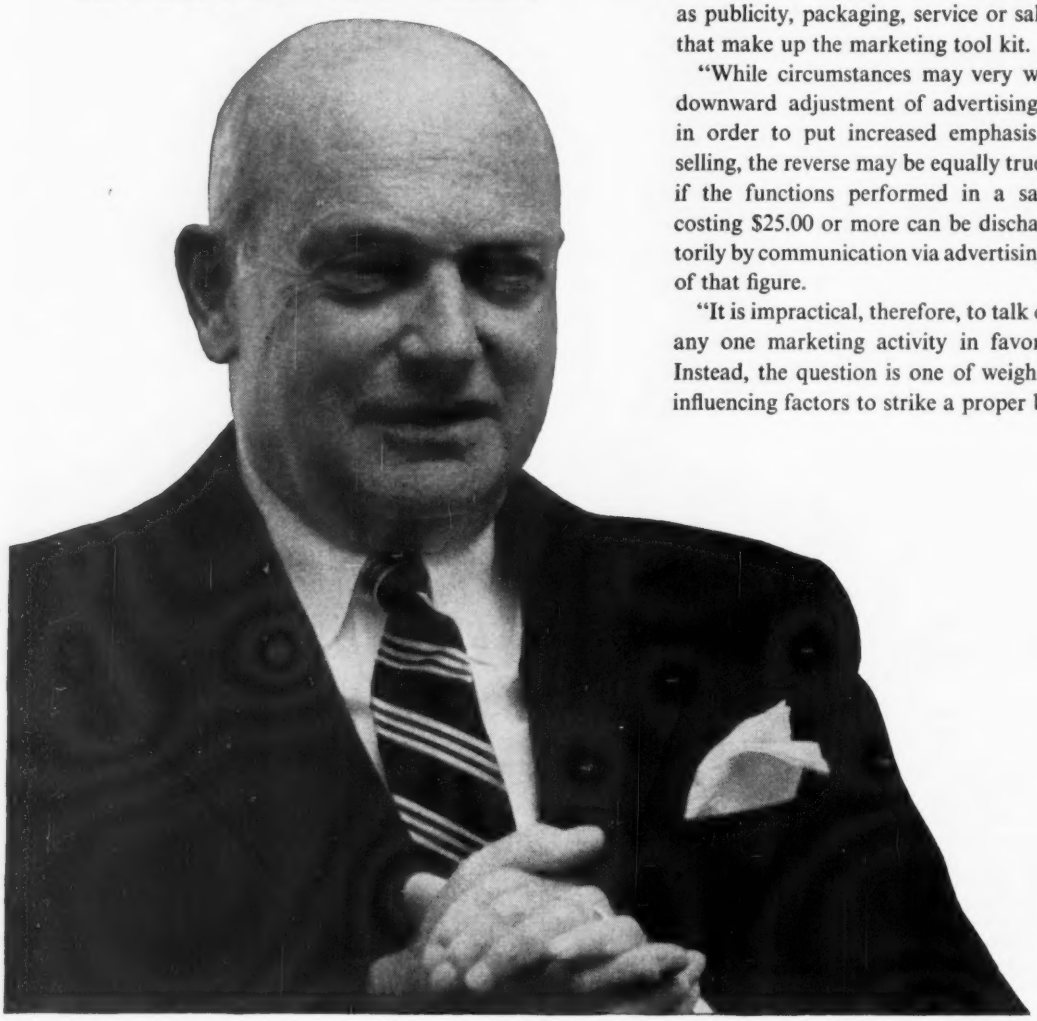
Job report courtesy of
National Tank Mfg. Co., Los Angeles, Calif.

use ARCOSITE BONDED FLUX

This 4,000-gallon tank for a resin reactor will handle highly corrosive material at temperatures of 500° to 600°F. Stainless top and bottom heads of type 316L were submerged arc welded to the body with Arcosite Flux and Arcos Chromenar Stainless Wire. This combination gives the proper weld metal chemistry for the needed corrosion resistance and an economical solution to the problem. ARCOS CORPORATION, 1500 S. 50th Street, Philadelphia 43, Penna.

"Why not cut out advertising and use the money to hire more salesmen?"

ROBERT HELLER, for 30 years a consultant to management of leading industrial firms and head of Robert Heller & Associates, Inc., Cleveland, answers a question that has crossed the minds of countless business executives.



"Advertising, although indispensable in our modern economy, can never perform the entire marketing job by itself. But neither can direct selling, nor any other single one of such sales-producing influences as publicity, packaging, service or sales promotion that make up the marketing tool kit.

"While circumstances may very well indicate a downward adjustment of advertising expenditures in order to put increased emphasis on personal selling, the reverse may be equally true. Particularly if the functions performed in a salesman's call costing $25.00 or more can be discharged satisfactorily by communication via advertising at a fraction of that figure.

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Small Gains Seen for October

LOOK FOR steelmaking to continue in the mid-fifties during most of October. The ingot rate may reach 60 per cent of capacity by the end of the month, but that's about the best you can hope for.

Orders are moving up "observably," as one steel company analyst put it, but there's certainly no snowballing of demand. The upturn is hardly more than a sidewise movement, with the "push" coming mainly from seasonal factors: New model production in the automotive and appliance industries.

Unfortunately for steelmen, the seasonal influences are less potent than usual this fall. Car and refrigerator manufacturers are going easy on initial production runs until their dealers can unload big inventories of unsold 1960 models. What's more, tin plate is going into a slump that will partly offset seasonal gains for cold rolled sheets.

OUTPUT TO RISE—Steelmakers estimate that their October sales and shipments will top last month's by 5 or 10 per cent. They look for a comparable gain in ingot production. Last week, furnaces were operated at 54.2 per cent of capacity, 0.1 percentage point below the previous week's revised rate. Production was about 1,545,000 ingot tons. During September, the operating rate averaged 52.5 per cent of capacity (vs. 54.2 per cent in August) and production was 6.4 million tons (vs. August's 6.8 million). At the three quarter mark, the 1960 total is 80.4 million tons, up 8 million tons from the strike curtailed output of last year's corresponding period.

FOURTH QUARTER PICKUP— Looking ahead, marketing men predict further gains for November and December. Fourth quarter operations are expected to rise gradually, hit a peak in November or early December, and trail off slightly at the year end. The ingot rate will probably average no more than 65 per cent. Assuming fourth quarter output of 24 million ingot tons, the year's total will be about 104 million (vs. 93.4 million last year). The upturn could be greater than expected if consumers: 1. Start hedging against a possible December price increase. 2. Start rebuilding depleted inventories. Neither is likely.

SERVICE CENTERS SLOW— Instead of adding to their stockpiles, most buyers are either holding the line or continuing to liquidate tonnage. Take service centers. Since June, they've cut their inventories from 3.8 million tons to 3.4 million. Although business seems to be picking up in some parts of the country, many distributors report that they'll make further reductions in their stocks. Sales are being hurt by the quick availability of almost all products from the mills.

CUTBACKS TO TAPER OFF— Although steelmaking operations have been at a low level for what seems like a long time—production has been less than 60 per cent of capacity for 13 weeks—it should be remembered that there were 27 such weeks in 1958. Then, as now, consumers were liquidating inventories. Between January and August, 1958, they cut their stocks from 19 million tons to 13 million. This year, consumers have trimmed their stocks to an even greater extent—from a peak of 18.5 million tons in April to about 11.5 million tons today. Still, inventories are larger than they were at the end of the strike (10 million tons). Liquidation may continue, but there's some consolation in knowing that it's bound to taper off. The fourth quarter inventory reduction probably won't be more than 1 million tons. During the summer, users cut their stocks by more than 1 million tons a month.

WHERE TO FIND MARKETS & PRICES

	News	Prices
Bars, Merchant	117	104
Reinforcing	...	105
Boiler Tubes	...	109
Canada	115	112
Charts:		
Finished Steel	...	103
Ingot Rate	102	...
Scrap Prices	...	115
Clad Steel	...	110
Coal Chemicals	...	112
Coke	...	112
Comparisons	...	103
Contracts Placed	121	...
Contracts Pend.	122	...
Electrodes	...	112
Fasteners	...	109
Ferroalloys	...	113
Fluorspar	...	112
Footnotes	...	109
Imported Steel	99	112
Ingot Rates	102	...
Metal Powder	...	112
Nonferrous Met.	118	120
Ores	...	112
Pig Iron	115	111
Piling	...	104
Plates	100	104
Plating Material	...	121
Prestressed Strand	...	109
Price Indexes	...	103
Producers' Key	105	...
R.R. Materials	102	109
Refractories	...	112
Scrap	114	116
Semifinished	...	104
Service Centers	100	111
Sheets	101	105
Silicon Steel	...	106
Stainless Steel	...	110
Steel Shipments	102	...
Strip	101	106
Structurals	121	104
Tin Mill Prod.	99	106
Tool Steel	...	110
Tubular Goods	99	110
Wire	...	106

*Current prices were published in the Sept. 26 issue and will appear in subsequent issues.

Metalworking Week—Page 29

Technical Outlook—Page 69

STEEL
QUARTERLY SURVEY

COMPONENTS	CURRENT INVENTORIES					4th Quarter FORECAST		
	UNDER 10 DAYS	10-30 DAYS	30-60 DAYS	60-90 DAYS	3-6 MONTHS	LOWER	SAME	HIGHER
CASTINGS . . . . . Die, gray iron, malleable, nonferrous, steel.	3%	23%	58%	12%	4%	22%	56%	22%
OTHER FORMED COMPONENTS . . . . Forgings, stampings, springs, wire shapes.	4%	14%	52%	21%	9%	21%	64%	15%
MACHINED COMPONENTS . . . . . Bearings, couplings, cylinders, gears, screw machine products.	8%	13%	47%	26%	6%	16%	70%	14%
ELECTRICAL EQUIPMENT, MOTORS . .	10%	22%	37%	27%	4%	22%	64%	14%
FASTENERS	7%	15%	47%	21%	10%	20%	69%	11%
MECHANICAL RUBBER GOODS, BELTING	5%	23%	51%	19%	2%	25%	62%	13%

FIGURES are percentages of respondents to STEEL's quarterly survey. UNDERSCORED figures show how most respondents reported.

Part Buying Begins to Stabilize

The number of STEEL survey respondents planning to build stocks approaches those planning continued reductions. Few dramatic shifts expected in fourth quarter

COMPONENT BUYERS have finally succeeded in working down much of the excess in their inventories. A tremendous buildup of goods in preparation for the strike last year and equally furious stockpiling immediately after the settlement left many purchasing agents with an overabundance of reserves.

Although inventory cutting will continue as buyers tend to hold forward commitments to the minimum to meet production schedules, the fourth quarter appears to be shaping up as one of reasonable stability.

• **Outlook**—The number of respondents to STEEL's quarterly survey of component buyers who are planning increased inventory levels by the end of the year rose to 16 per cent vs. 7 per cent in the last survey (see STEEL, July 4, p. 95). The edging up reinforces the feeling in some circles that there will be a moderate upturn during the last three months of 1960. Continued depletion of reserves is planned by 20 per cent of those polled. But the closeness of the number of respondents in each category indicates a stabilization of purchases. (In the past two years, the fourth quarter has been one of few dramatic shifts in the inventory situation.)

• **Few Major Shifts**—While 23 per cent of the purchasing agents report stocks below the level of three months ago (only 7 per cent revealed an upturn), there were few general shifts in all product categories. The inventory adjustments were mixed, and the over-all status of stocks, although generally on the lower side, is not radically different from the position at this time last quarter. The breakdown: Under ten days, 6 per cent; 10 to 30 days, 18 per cent; 30 to 60 days, 50 per cent; 60 to 90 days, 20 per cent; over 90 days, 6 per cent.

Significant changes were registered by fasteners, with a drop in the 10 to 30 day category and increases in the under ten and 60 to 90 day periods; castings with a drop in the 30 to 60 day grouping and a rise in the 10 to 30 day range; electrical equipment and motors with a sharp upturn in the 60 to 90 day level and a drop in 10 to 30 and 30 to 60 day categories; and a rise in the under ten day grouping of machined components.

The present inventory situation is better than most buyers had anticipated. Only 12 per cent felt their

stocks were lower than originally intended, while 25 per cent said they were higher.

• **Surplus Reported**—The number of respondents worrying about having too much of something remained at 21 per cent—about the same as it has been since April. Castings, particularly steel castings, and electrical equipment and motors, mainly fractional motors, were causing the most concern. Nearly 88 per cent of the overstock mentions fell into those two product categories.

Delivery problems continued to decline, falling to the lowest level (18 per cent of the buyers) in over two years. Electrical equipment is the source of much difficulty, accounting for 43 per cent of the mentions.

Chicago's Steel Imports Cut 69 Per Cent in 1960

Steel imports into the port of Chicago via the St. Lawrence Seaway declined in August to 6899 tons, compared with 27,803 tons in August, 1959, reports the Chicago Association of Commerce & Industry. The July, 1960, total was 9700 tons.

Through August this year, waterborne steel imports into the port amounted to 44,925 tons, 69 per cent less than during the comparable period last year, when 143,397 tons were brought in.

Slightly over 31 per cent of the August total was classified as structurals. Wire rods made up 25 per cent; wire and wire products (including nails and staples), almost 13 per cent; bars, 13.5; tubing and pipe, 8; nuts, bolts, screws, and washers, 7; barbed wire, 1; and sheets, 0.8.

Tin Plate . . .

Tin Plate Prices, Page 106

Producers of tin plate have just about abandoned hope that 1960 will be a record shipment year. Peak demand has passed, and the market has softened appreciably.

Because of bad weather early in the year, corn and pea crops have been disappointing. Grapefruit production hasn't been up to expectations either, and to complicate the situation for tin plate, aluminum cans are making headway in packaging of frozen citrus juices.

The movement of tin plate cans in July was 453,187 tons vs. 424,481 in June this year and 502,725 in July, 1959, reports the Census Bureau. The total for the first seven months was 2,567,507 tons vs. 2,694,079 in the like 1959 period. Shipments of aluminum cans amounted to 1529 tons in July vs. 1791 in June. The total for the first seven months was 11,506 tons.

Tubular Goods . . .

Tubular Goods Prices, Page 110

Midwestern producers of buttweld pipe report demand is sufficient to enable them to boost production 10 points to 70 per cent of capacity. There is considerable building activity at some points, calling for substantial tonnages, and pipe jobbers who have let their stocks become depleted are beginning to restock.

Hughes Tool Co.'s weekly survey shows 1788 rotary oil rigs were oper-

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NEW MILLER CONSTANT POTENTIAL D.C. WELDER CP-3-VS
X-ray perfect MIG welds on aluminum, magnesium, stainless and carbon steel sheets down to .030" are the routine result with the New Miller Constant Potential, CP-3-VS. Continuous slope and voltage adjustment even during the course of the weld means that the operator is able to "tune in" the desired settings. There's no burn-through; there's no spatter. Actually, a new performance high in low voltage welding is established with the introduction of this welder with its broad range of from 300 amps at 30v to 25 amps at 10v. • Complete specifications, as well as recommendations for your particular application problems, will be sent promptly upon request.
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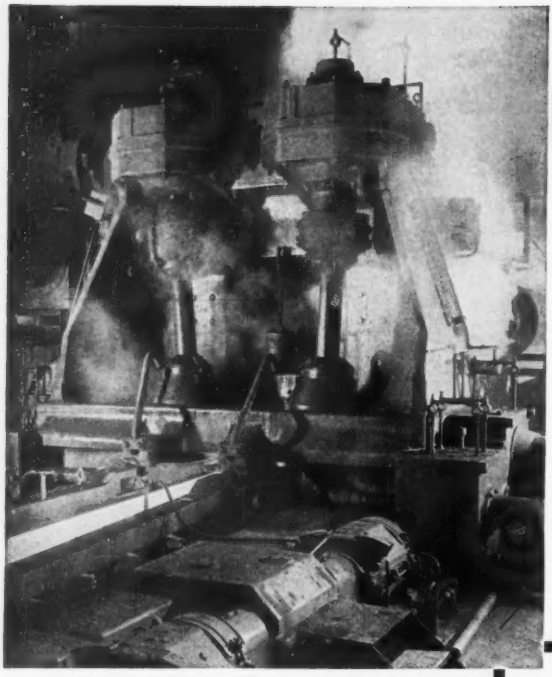

Edging hot strip steel

No place for second-best equipment. That's why this heavy-duty vertical overdrive edger uses rugged Cone-Drive **double-enveloping worm** gearing to drive the vertical rolls continuously.

Rugged Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

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ating in the U. S. and 135 in Canada in the latest week of record. That's an increase of 61 over the preceding week's count of 1862.

Bids are in at Wenatchee, Wash., for 1183 tons of 8, 18, and 24 in. cast iron pipe.

Metal Distributors Plan Cost Analysis Seminar

An analytical seminar on distribution cost analysis, sponsored by the Steel Service Center Institute, the National Association of Aluminum Distributors, Copper & Brass Research Association, and the Canadian Steel Warehouse Association, will be held at the Commodore Hotel, New York, Oct. 17-19.

Purpose: Provide accounting executives in the industry up-to-date information on the best techniques for preparing specialized cost reports. Thomas J. McGann, consultant on distribution and cost analysis, will run the seminar.

Distributors . . .

Prices, Page 111

October is historically a better month than September, but distributors have been so disappointed with business since the end of the summer vacation season they scarcely know what to expect. They are selling more tonnage than they are receiving from the mills, and inventories continue to shrink. Quick deliveries offered by producers are hurting steel service center sales.

Plates . . .

Plate Prices, Page 104

Demand for plates is a shade better than it has been. In shipwork, prospects are particularly encouraging. Latest development in the Maritime Administration's accelerated program involves the placing of six freighters with the Ingalls Shipbuilding Corp. for the Farrell Lines Inc. Cost: More that $62.7 million.

The ships bring the total placed since the first of the year up to 23, a gain of 15 since July 1. They follow recent awards of five for the United States Lines and four for Lykes Bros. Steamship Co. The United States Lines is seeking bids for six additional vessels.

Orders for about 9000 tons of steel (75 per cent plates) are being dis-

tributed by the Sun Shipbuilding & Dry Dock Co., Chester, Pa., for its new drydock. The Portsmouth, N. H., Naval shipyard is expanding ways for submarine and other shipbuilding.

Sheared plates are available for delivery within ten days to two weeks and alloy plates within three to four weeks. Most users are not rebuilding inventories, even where they are subnormal.

Price of Select Tantalum Sheets Cut 10 Per Cent

The price of select noncapacitator tantalum sheets has been cut 10 per cent by Kawecki Chemical Co., Boyertown, Pa. The new price is the same as that formerly charged for standard tantalum sheets. The latter grade has been eliminated; it lacks the fine surface finish of the select grade, says Joseph C. Abeles, president of the company.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 105 & 106

There is increasing evidence that consumers' stocks of light flat rolled steel have about reached bottom. Buyers, however, haven't started to rebuild their inventories and probably won't until mill deliveries start tightening.

Producers can still offer hot rolled sheets for shipment within two to three weeks and cold rolled in three to five weeks. Galvanized sheets are available in four weeks, pressure for that grade now being definitely off from a month ago.

September shipments were about 10 per cent larger than August's, but there has been little change in the rate of ordering. This month, business should be better, but sheetmakers don't expect any spectacular gains in bookings.

In the automotive market, overall demand is good, although below expectations. Order volume fluctuates constantly as some auto firms increase their buying and others push tonnage back to allow their dealers time to unload 1960 models.

The automakers plan good production schedules in October and November to provide stocks of the new model cars for dealers. Most of them hold substantial steel inventories, and much of their new

Are Small Precision Metal Parts Disturbing Your Sleep?

The manufacture of small precision metal parts—in large volume—can sometimes take on the aspects of a bad dream. The problems are frequently numerous and complex. Their solution calls for specialized experience.

Torrington is the leading specialist in this field. We have the skill, engineering experience and manufacturing facilities to produce—at high speed and economical cost—a tremendous variety of small metal parts of exceptional precision and uniformity.

If you have such parts to be manufactured in large quantities, why not let Torrington solve your entire problem? Write us for complete information—or better yet, send us a blueprint, and we'll be prompt in making our recommendation.

progress through precision **SPECIAL METAL PARTS**

THE TORRINGTON COMPANY Torrington, Connecticut

ordering is on short leadtime.

A decline in the movement of steel shipping barrels and drums occurred in July, shipments totaling 2,549,388 units vs. 2,819,622 in June this year and 2,856,915 in July, 1959. Shipments in the first seven months this year were 17,806,069 units compared with 21,257,630 in the like 1959 period.

The movement of steel pails also declined in July (to 6,406,044 units) compared with 7,717,979 in June this year and 7,294,396 in July last year. The first seven months' total was down to 42,461,099 from 49,523,212 in the like 1959 period.

Rails, Cars . . .

Track Material Prices, Page 109

Freight car orders in August amounted to 1343 units vs. 1306 in July this year and 1757 in August, 1959, reports the American Railway Car Institute and the Association of American Railroads. Deliveries totaled 4124 cars vs. 3893 in July this year and 4890 in August, 1959.

Backlogs as of Sept. 1 showed 13,178 units on order in railroad shops and 10,688 in commercial shops, a total of 23,866. That compares with 26,658 on Aug. 1 this year and 37,172 on Sept. 1 last year.

Structural Steel Bookings Declined in August

Structural steel bookings in August declined to 261,976 tons, reports the American Institute of Steel Construction. However, they were up 33 per cent from bookings in August a year ago when the steel strike was on.

Total bookings for the first eight months were 2,267,875 tons, up 10 per cent from the same period last year, when 2,068,369 were placed.

August shipments were 331,932 tons, up 10 per cent from the preceding month and 51 per cent over a year ago. Shipments for the first eight months were 2,264,196 tons, up 7 per cent from the same period in 1959 when 2,110,040 tons were moved.

Order backlogs as of Aug. 31 totaled 2,114,179 tons. Of that total, 58 per cent (1,226,928 tons) was scheduled for fabrication during the four months ending Dec. 31.

Steel Product Shipments by Markets—July, 1960

(Net tons)

	July		First Seven Months	
Markets:	1960	1959	1960	1959
Converting, processing	158,592	180,560	1,986,670	2,182,622
Forging (except auto)	38,835	46,760	578,272	680,849
Fasteners	52,518	48,765	721,142	833,140
Warehouses:				
Oil & gas	71,239	124,793	735,210	1,388,042
All other	746,294	721,409	7,815,187	8,283,449
Total warehouse	817,533	846,202	8,550,397	9,671,491
Construction:				
Rail transportation	2,115	2,362	33,056	33,656
Oil & gas	205,091	166,172	1,442,516	1,872,044
All other	533,107	388,426	4,830,281	4,838,787
Total construction	740,313	556,960	6,305,853	6,744,487
Contractors' products	250,944	227,780	2,434,120	2,717,213
Automotive:				
Cars, trucks, parts	794,653	688,351	9,132,462	10,329,820
Forgings	16,154	19,108	286,700	329,518
Total automotive	810,807	707,459	9,419,162	10,659,338
Rail transportation:				
Rails, track, equipment	48,870	41,058	602,838	686,499
Cars & locomotives	81,948	90,566	1,301,122	1,203,963
Transit systems	3,084	1,804	23,173	17,852
Total transportation	133,902	133,428	1,927,133	1,908,314
Shipbuilding	43,394	43,204	380,743	514,182
Aircraft	4,478	4,670	50,387	48,210
Oil & gas drilling	23,149	26,953	291,645	431,826
Mining, quarrying, etc.	17,301	12,844	183,406	182,721
Agricultural:				
Machinery	31,276	62,518	501,872	731,593
All other	15,549	24,331	158,964	228,425
Total agricultural	46,825	86,849	660,836	960,018
Machinery, tools, etc.	211,786	283,299	2,755,503	3,178,679
Elec. machinery & equipment	120,042	114,054	1,332,037	1,536,902
Appliances, utensils	97,828	103,532	1,231,411	1,362,527
Other equipment	128,960	106,599	1,298,702	1,383,908
Containers:				
Cans & closures	478,731	265,926	3,446,471	3,879,867
Barrels, pails, etc.	50,930	43,739	556,921	591,748
All other	40,955	19,814	419,871	391,498
Total containers	570,616	329,479	4,423,263	4,863,113
Ordnance, military	16,785	6,076	94,469	103,610
Nonclassified shipments	148,100	183,625	1,282,294	1,204,748
Total domestic shipments	4,432,808	4,049,098	45,907,445	51,167,898
Exports	277,757	82,169	1,662,507	1,165,702
Total shipments	4,710,565	4,131,267	47,569,952	52,333,600

Data from American Iron & Steel Institute.

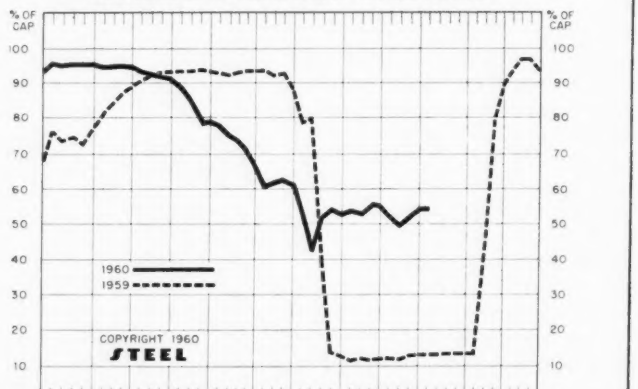
DISTRICT INGOT RATES

(Percentage of capacity utilized)

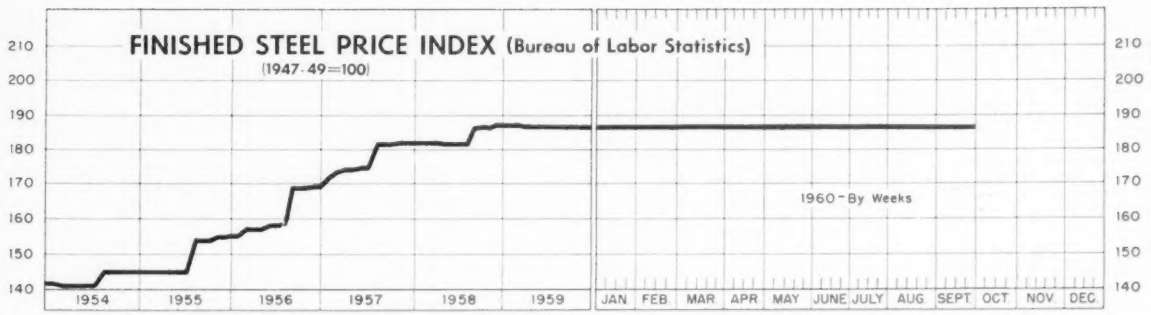
	Week Ended Oct. 2	Week Ago	Month Ago	Year Ago
Northeastern	62	62	54	*
Buffalo	57	59	56	*
Pittsburgh	46	42	44	*
Youngstown	44	47	41	*
Cleveland	60	55	53	*
Detroit	72	71	72	*
Chicago	58	61	58	*
Cincinnati	56	57	56	*
St. Louis	75	77	63	*
Southern	49	47	59	*
Western	51	55	48	*
Total Industry	54.2	54.3	52.0	12.8
Index (1947-49=100)	96.2	96.3	92.3	22.5
Net Tons (In thousands)	1,545	1,547	1,483	362

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute. *Not available due to general strike.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Sept. 27, 1960	Week Ago	Month Ago	Sept. Index	Year Ago
186.2	**186.2**	**186.2**	**186.2**	**186.8**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Sept. 27

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	195.395
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.414
		Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Sept. 28 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	207.63
Index in cents per lb	6.713	6.713	6.713	6.713	5.625

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$127.41
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	31.33	32.00	32.67	43.00	45.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Sept. 28 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.50
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.80	5.30	4.50
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25-6.45
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35-6.45
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Sept. 28 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.16
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	59.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$30.50	$30.50	$31.50	$44.50	$43.50
No. 1 Heavy Melt, E. Pa.	35.00	35.00	35.00	44.00	46.50
No. 1 Heavy Melt, Chicago	28.50	30.50	31.50	40.50	45.00
No. 1 Heavy Melt, Valley	31.50	31.50	33.50	43.50	46.50
No. 1 Heavy Melt, Cleve.	29.50	29.50	31.50	40.50	44.00
No. 1 Heavy Melt, Buffalo	29.50	29.50	29.50	33.50	38.50
Rails, Rerolling, Chicago	52.50	52.50	58.50	62.50	64.50
No. 1 Cast, Chicago	38.50	39.50	41.50	56.50	47.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Sept. 28, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 105; footnotes, page 109.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ..109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 .....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ...7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1 .5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. .I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 .....7.95
Cleveland J5 , R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Pa. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ...5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra)
Carbon
LosAngeles P2 S30 ...11.75*
Alloy
Ambridge, Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 .....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ....9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 .....9.225
S.Chicago,Ill. W14 .....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025

Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ....6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4...5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14...6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ...7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J3 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ...6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 .....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875‡
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875‡
SparrowsPt.,Md. B2 ..6.875‡
Warren,O. R2 .....6.875‡
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 .....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel So.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Wire Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.10	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.10	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (FERROLITE) (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield, Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

SILICON STEEL

C.R COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill G4	....	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	....	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	....	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	....	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	....	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	....	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	....	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	....	11.70†	12.40	13.55	14.65
Vandergrift,Pa. U5						8.10
Mansfield,O. E6						8.10
Warren,O. R2 (Silicon Lowcore)						8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 ....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 ....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 .....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 .....12.90
Minnequa,Colo. C10 ....12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 .....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Millbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 ....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St. Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

STEELMAKING AT JESSOP

Experience counts . . . and Jessop has it

There is no substitute for experience in making steel for the reactors of nuclear submarines like the Nautilus, the Skate and the Polaris-firing George Washington. Jessop's activity in nucleonics dates back to the early days of the Manhattan Project.

Today, Jessop's still at it—continuing research, improving techniques, piling up experience in making sophisticated steels to harness the atom. And Jessop is out front in other steelmaking fields too.

Whether you use heat- or corrosion-resistant stainless steels; abrasion- or shock-resistant steels; nonmagnetic or precision ground steels; high speed, cast-to-shape, clad or alloy steels, you can be sure of the quality—and *service*—you'll get when you do business with Jessop.

In quality steelmaking experience counts, and Jessop has it. Call a Jessop sales office in any of 23 major cities of North America and discuss *your* needs for specialty and alloy steels.

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Washington, Pennsylvania

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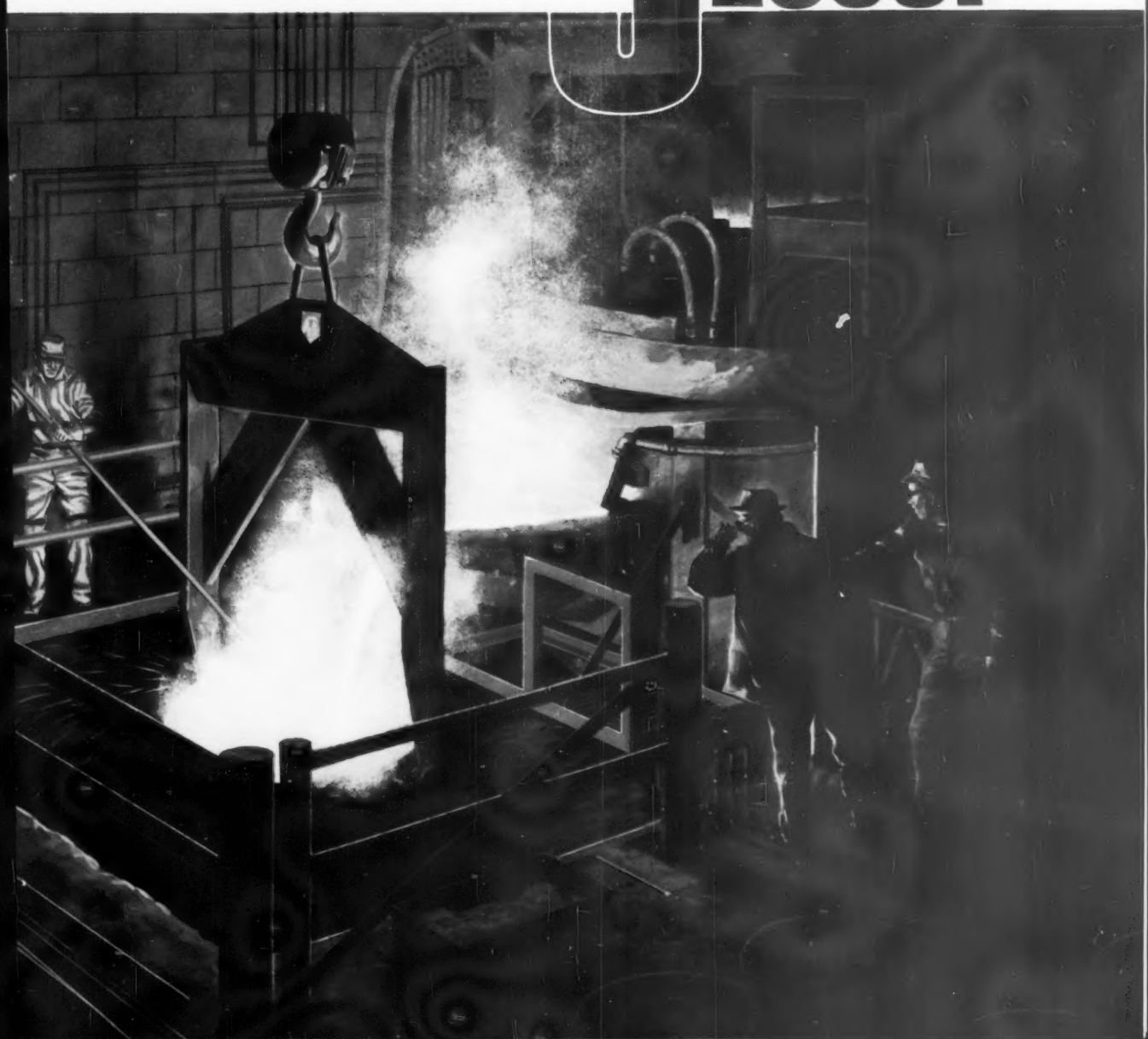
JESSOP



FOR EXTRA LOAD CAPACITY IN MINIMUM RADIAL SPACE use

McGILL®

GUIDEROL® BEARINGS

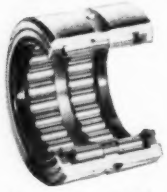
MT SERIES

Here is a compact bearing with high load-carrying capacity. Its full complement of race-width rollers is guided by an integral rail in the outer race bore, providing strength and skewing limitation that prevents binding under controlled misalignment. Rollers are guided at any operational angle from horizontal to vertical — self-cleaning through open ends. Available with or without separate inner ring in shaft sizes from ½" to 9¼". Dimensionally interchangeable with ordinary heavy duty needle bearings.

CT SERIES

Offer full type roller bearing capacity dimensionally interchangeable with ball and cylinder roller bearings of single and double row dimensions. The inner ring may be eliminated for further reduction of radial space.

SEALED—AND STILL COMPACT



No extra axial space needed for the sealed SG series GUIDEROL bearing. Seals are press-fitted securely in the outer race bore to provide the same width and performance advantages of standard GUIDEROL bearings. Contaminants are locked out, lubricants sealed in for those hard to re-lubricate applications. The SG series solves the problem of too-expensive auxiliary sealing assemblies.

Write for McGill's Bearing Catalog #52-A, for engineering data with dimensional and capacity information on McGill needle type roller bearings. Ask about special precision ball and roller bearings.

McGILL MANUFACTURING CO., INC., Bearing Division
301 N. Lafayette Street, Valparaiso, Indiana

engineered electrical products

McGILL®

precision needle roller bearings

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
Sparrows Pt.,Md B2	175
Sterling,Ill.(7) N15	176
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va., W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B2	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville, Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'im'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80††
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1¼ in. through 1½ in. tapped S threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts. 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread. ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread. ¼ in. through 1½ in., semif'inished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS, Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packages	+5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in., larger 12.85 7/8 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. in.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.66	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.22	63.57	48.13
2½	12	58.73	68.83	52.15
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINTS BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+2.75	12.75	+3.5	12.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+2.75	12.75	+3.5	12.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+2.75	12.75	+3.5	12.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+2.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+2.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+2.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	42.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	56.75
308	32.00	36.25	49.00	50.25	54.75	57.75	56.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	....	65.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	36.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	42.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Strip, Carbon Base —Cold Rolled— Both Sides
Copper*	36.80	44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa. deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30

	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.27	8.66	10.06	....	8.28	8.95	11.80	16.38	9.53	8.84	10.43
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.98	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.43	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	10.03	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.29	11.35	61.27	10.60	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	9.84	10.05	....	....	11.24	9.92	12.74	....	10.33	10.12	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	9.24	10.70	11.45	....	10.90	9.34	11.15	16.45	9.83	9.17	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.85	10.00	10.89	52.71	10.85	9.25	11.95	16.38	9.45	9.20	10.45
Pittsburgh	8.57	9.98	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	10.20	12.05	12.35	....	12.20	10.20	16.65	17.80	10.80	10.35	12.50
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.45	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. x 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump, ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon ⅞" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (Carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill (Per Base Box; **Products** 100 lb basis wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots (per keg)	
400 keg min.	$8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe, 36.75, ton, del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots 41.80	
Brass, 80/20, leaded (60 mesh)	39.90
Bronze filter powder, 90/10	47.00*
Cobalt, 50 mesh	1.58
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	60.70
Solder	15.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	25.90
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten:	Dollars
Carbon and hydrogen reduced, 98.8% min., minus 65 mesh	nom.**
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. ‡Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., Ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.75	....	$5.65	$5.50	$5.85
Bar Size Angles	5.95	....	5.85	5.70	6.05
Structural Angles	5.95	....	5.65	5.50	5.85
I-Beams	5.70	....	5.60	5.45	5.80
Channels	5.70	....	5.60	5.45	5.80
Plates (basic bessemer)	5.85	....	5.75	5.60	5.95
Sheets, H.R.	Nom.	....	Nom.	Nom.	Nom.
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	Nom.	....	Nom.	Nom.	Nom.
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.95	....	5.85	5.70	6.05
Hot-Rolled Bands	6.20	....	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	6.40	....	6.20	6.20	6.60
Wire Rods, O. H., No. 5	6.55	....	6.35	6.35	6.70
Bright Common Wire Nails (§)	7.25	....	7.15	7.00	7.35

*Books closed for 1960-61 shipping season. †Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or truck, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va., Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1 50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max), Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5-8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅝ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21 15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Scrap Prices Still Point Down

STEEL's composite on No. 1 heavy melting steel declines 67 cents a ton to $31.33 as the mills remain out of the market, and export demand shows signs of easing

Scrap Prices, Page 116

• **Pittsburgh**—Brokers' bids on industrial scrap from the local plant of GM's Fisher Body Div. will provide the next test of the market. Because of the large tonnage being offered and the lack of consumer interest, observers predict bids will be no higher than last month's. Pennsylvania Railroad got a surprisingly good price ($37.86) for its No. 1 heavy melting scrap, but otherwise the market remains weak with demand sluggish.

• **Philadelphia**—With domestic demand dull and export requirements less pressing, the market is easier. Some tonnage for export is now being offered at 50 cents to $1 a ton less than recently, and the development may be reflected soon in prices on open hearth grades.

• **New York**—Brokers have reduced their buying prices $1 a ton on No. 1 heavy melting and No. 1 bundles to $30-$31. The development reflects continued dull domestic consumption and further weakening in the export market. Also, prices on low phos structurals and plates have been cut sharply to a nominal $33-$34.

• **Buffalo**—The Lackawanna plant of Bethlehem Steel Co. held up incoming scrap shipments because of a threatened railroad strike. The development weakened the local scrap market. At the moment, the price structure is unchanged throughout the list and no early changes are expected.

• **Chicago**—Open hearth grades of scrap are off $1 to $2 a ton on limited mill purchases. Tonnage involved is small, but it is sufficient to establish prices in an extremely weak market. No. 1 heavy melting was acquired at $30 delivered for material of industrial origin, and $28 for dealer material, No. 1 factory bundles at $35, and No. 1 railroad heavy melting at $33, the first three grades being off $2 and the fourth $1.

• **Cleveland**—A great deal of uncertainty over the price trend is evident in this market. Little tonnage is moving—in fact, not enough to provide a real test of quoted prices. Steelmaking operations here, at 60 per cent, are up 5 points from a week ago, but the Youngstown ingot rate is off 3 points to 44 per cent. Heavier monthend auto lists are expected to intensify market weakness in the absence of strong consumer demand. Only spotty demand for cast scrap is noted.

• **Cincinnati** — Dealers have reduced their buying prices $1 a ton on the principal steelmaking grades. No. 1 heavy melting is quoted $25.50-$26.50 in broker buying lists.

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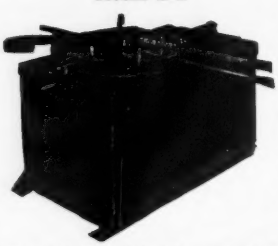
KARDONG FOUR-WAY BENDER
For Concrete Reinforcing Bars
Model D-2



The Model D-2 Kardong Bender is a Four Direction Horizontal Bender. With this bender it is not necessary to turn bars over to make reverse or second bends on beam bars. The Model D-2 is made in two sizes, Model D-2 Standard 6-inch, which will bend bars around collars 2-inch to 6-inch, and Model D-2 Special 8-inch, which will bend bars around collars 2-inch to 8-inch. Capacity of both models, 1¼-inch Square Bars. The Model D-2 is a production bender for reinforcing steel fabricating shop. Ask for catalog of our complete line of reinforcing bar benders.

KARDONG BROTHERS, INC.
MINNEAPOLIS 13, MINN.

EMOTIONAL FACTORS
UNDERLYING INDUSTRIAL PURCHASES

A Motivational Research Study by
Dr. F. Robert Shoaf for STEEL Magazine

This probing, depth-type study is available complete with conclusions and practical applications, attractively bound in 96-page hard cover form. Real, hard-hitting sales and advertising ideas based on the findings of one of the best and most widely acclaimed studies ever conducted in industrial marketing. Some of the topics discussed:

- How to use emotional factors in your advertising.
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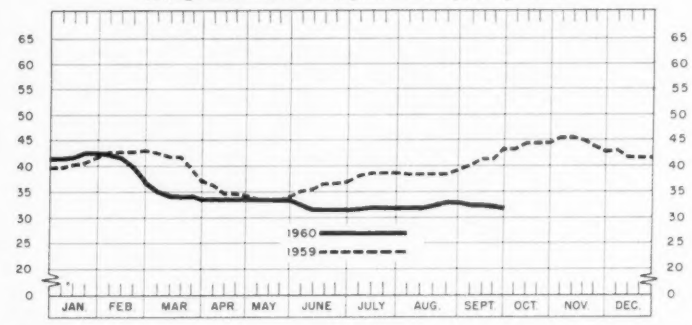
- Ten ground rules for industrial salesmen.

PRICE $4.00 POSTPAID
STEEL, PROMOTION DEPT., 1213 W. 3rd ST., CLEVELAND 13, OHIO

STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.



Sept. 28 1960	Week Ago	Month Ago	Year Ago	August Avg.
$31.33	$32.00	$32.67	$43.00	$32.33

Further reductions are anticipated with weakness developing on industrial lists.

• **St. Louis** — Demand remains weak, and the few minor shifts noted in price quotations are merely normal adjustments.

• **Birmingham** — Prices are unchanged. Some feelers are out for electric furnace grades for October delivery, and sellers expect a slight price advance in this area of the market.

• **Houston**—The market continues depressed. None of the Texas foundries is buying, and the steel mills are out of the market. There is practically no demand for No. 2 bundles.

• **Seattle**—While no changes are reported in prices, the market continues soft. Domestic demand is slow, but two full cargoes will move to Japan from the Seattle-Tacoma area this month. Exporters are also busy at Portland, Oreg.

Sale of nearly 600,000 tons to Japanese buyers for last quarter has been confirmed by local exporters. The total involves 63 full cargoes, averaging about 9000 tons gross, at 35 cents a ton less than was paid for the 89 cargoes purchased for third quarter delivery.

• **San Francisco** — Shipments to Japan will be off possibly 8 to 10 per cent in the last quarter compared with shipments in the current three month period.

• **Los Angeles** — The market is quiet. Dealers hesitate to predict, expressing concern over the large stocks of the more popular grades.

Scrap Stocks Rise Less Than 1 Per Cent in July

Consumers' stocks of scrap at the end of July totaled 8,652,000 gross tons compared with 8,626,022 at the end of June, reports the U. S. Bureau of Mines. Pig iron stocks compared this way: 3,352,000 vs. 3,253,316 tons.

During July, 3,687,000 tons of scrap were consumed vs. 4,485,444 in the preceding month. Pig iron consumption was 3,889,000 tons vs. 4,691,902. The metallic charge in the month (excluding iron ore and agglomerates) was 49 per cent scrap, 51 per cent iron, the same as in June.

Home scrap produced during July accounted for 2,284,000 tons, 20 per cent less than during June. Purchased scrap received by consumers dropped for the fifth consecutive month. The total, 1,420,000 tons, was 20 per cent less than June's. Of the purchased scrap, 80 per cent was received from dealers, 20 per cent from other sources.

Pig Iron . . .

Pig Iron Prices, Page 111

Merchant pig iron buying continues at a modest rate, short of the seasonal volume expected. Foundries are getting a better flow of orders for castings from the automotive industry and other users.

Shifts in blast furnace operations fail to indicate any definite trend. U. S. Steel Corp. banked its No. 8 furnace at South Works, South Chicago, Ill., Sept. 24. Of the Chicago district's 43 furnaces, only 21 are active. Excepting last year's steel strike period, that's the smallest number of stacks active since April, 1958, when 20 were in operation.

Republic Steel Corp. is relighting its blast furnace at Troy, N. Y. The stack had been out of production since July 1.

U. S. Steel Corp. awarded a contract for the construction of a blast furnace at its Duquesne (Pa.) Works to John Mohr & Sons, Chicago. The unit will have annual capacity of about 850,000 tons and is scheduled for completion in about two years (STEEL, Aug. 8, p. 82).

Contracts Let for Direct Reduction Iron Smelter

Contracts have been placed by New Mylamaque Explorations Ltd., Toronto, Ont., with Koppers of Canada Ltd. and Strategic Materials Corp., New York, for construction of a $14 million plant to produce iron by the Strategic-Udy direct reduction process.

Plans call for a smelting plant, a concentrating plant, and other facilities near Kingston, Ont. Strategic Materials and Koppers will build the plants, and Koppers will operate the smelter.

Canadian Steel Could Be Headed for Record Year

Canada may be heading for its biggest steel production year despite lower output in recent weeks. Record tonnage (3,981,423) of steel ingots was poured in the first eight months this year, operations averaging 88.9 per cent of capacity. Tonnage output was up 6.8 per cent from that in the like 1959 period.

The final quarter of 1959 was a boom period for Canadian steel, surpassed only by the first quarter of 1960. Consequently, the industry will have to operate slightly above 80 per cent the rest of this year if it's to set a new record. Production

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Sept. 28, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Sept. 28	$31.33
Sept. 21	32.00
Aug. Avg.	32.33
Sept. 1959	41.25
Sept. 1955	44.42

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	26.00-27.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	25.00-26.00
No. 1 busheling	30.00-31.00
No. 1 factory bundles	38.00-39.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	37.00-38.00
3 ft and under	36.00-37.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	39.00-40.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	34.00-35.00
Unstripped motor blocks	25.00-26.00
Clean auto cast	37.00-38.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00-39.00*
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	*43.00-44.00*
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*29.00-30.00*
No. 1 hvy melt., dealer	*27.00-28.00*
No. 2 hvy melting	*25.00-26.00*
No. 1 factory bundles	*32.00-33.00*
No. 1 dealer bundles	*28.00-29.00*
No. 2 bundles	*16.00-17.00*
No. 1 busheling, indus.	*29.00-30.00*
No. 1 busheling, dealer	*27.00-28.00*
Machine shop turnings	*12.00-13.00*
Mixed borings, turnings	*14.00-15.00*
Shovel turnings	*14.00-15.00*
Cast iron borings	*14.00-15.00*
Cut structurals, 3 ft	*32.00-33.00*
Punchings & plate scrap	*34.00-35.00*

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Stove plate	*32.00-33.00*
Unstripped motor blocks	*30.00-31.00*
Clean auto cast	*43.00-44.00*
Drop broken machinery	*43.00-44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00-33.00*
R.R. malleable	*42.00-43.00*
Rails, 2 ft and under	*44.00-45.00*
Rails, 18 in. and under	*45.00-46.00*
Angles, splice bars	*38.00-39.00*
Axles	52.00-53.00
Rails, rerolling	52.00-53.00

Stainless Steel Scrap

18-8 bundles, solids	170.00-175.00
18-8 turnings	85.00-90.00
430 bundles & solids	80.00-85.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*21.00-22.00*
No. 2 heavy melting	16.00-17.00
No. 1 bundles	*24.00-25.00*
No. 2 bundles	*13.00-14.00*
No. 1 busheling	*20.00-21.00*
Machine shop turnings	*7.00-8.00*
Mixed borings, turnings	*9.00-10.00*
Shovel turnings	*9.00-10.00*

Cast Iron Grades

No. 1 cupola	*32.00-33.00*
Stove plate	*25.00-26.00*
Heavy breakable	*25.00-26.00*
Unstripped motor blocks	19.00-20.00
Charging box cast	*25.00-26.00*
Clean auto cast	*40.00-41.00*

CLEVELAND

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	21.00-22.00
No. 1 factory bundles	*31.00-32.00*
No. 1 bundles	29.00-30.00
No. 2 bundles	17.00-18.00
No. 1 busheling	29.00-30.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	32.00-33.00
Cut structurals, plate 2 ft and under	35.00-36.00
Low phos. punchings & plate	29.00-30.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	31.00-32.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Charging box cast	31.00-32.00
Heavy breakable cast	28.00-29.00
Stove plate	37.00-38.00
Unstripped motor blocks	30.00-31.00
Brake shoes	35.00-36.00
Clean auto cast	47.00-48.00
Burnt cast	38.00-39.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Rails, random length	42.00-43.00
Cast steel	36.00-37.00
No. 1 railroad cast	44.00-45.00
Railroad specialties	44.00-45.00
Angles, splice bars	45.00-46.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	165.00-170.00
18-8 turnings	75.00-80.00
430 clips, bundles, solids	85.00-90.00
430 turnings	20.00-30.00†

YOUNGSTOWN

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	23.00-24.00
No. 1 busheling	31.00-32.00
No. 1 bundles	31.00-32.00
No. 2 bundles	20.00-21.00
Machine shop turnings	13.00-14.00
Shovel turnings	18.00-19.00
Cast iron borings	18.00-19.00
Low phos.	33.00-34.00
Electric furnace bundles	33.00-34.00

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*

BUFFALO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00†
No. 1 bundles	29.00-30.00
No. 2 bundles	21.00-22.00
No. 1 busheling	29.00-30.00
Shovel turnings	16.00-17.00
Machine shop turnings	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plate, 2 ft and under	37.00-38.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	47.00-48.00

Railroad Scrap

Rails, random lengths	41.00-42.00
Rails, 3 ft and under	47.00-48.00
Railroad specialties	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*25.50-26.50*
No. 2 heavy melting	*21.50-22.50*
No. 1 bundles	*25.50-26.50*
No. 2 bundles	17.50-18.50
No. 1 busheling	*25.50-26.50*
Machine shop turnings	9.00-10.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	12.00-13.00
Cast iron borings	12.00-13.00
Low phos. 18 in.	*34.00-35.00*

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable cast	30.00-31.00
Charging box cast	35.00-36.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	49.00-50.00
Rails, random lengths	41.00-42.00

PHILADELPHIA

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	36.00
No. 2 bundles	21.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00
Machine shop turnings	15.00
Heavy turnings	28.00†
Structurals & plates	38.00-40.00
Couplers, springs, wheels	40.00
Rail crops, 2 ft & under	51.00-52.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	*38.00*
Drop broken machinery	49.00-50.00
Malleable	46.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	21.00-22.00
No. 1 bundles	*30.00-31.00*
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	*33.00-34.00†*

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	30.00-31.00

Stainless Steel

18-8 sheets, clips, solids	160.00-165.00
18-8 borings, turnings	80.00-85.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	26.00-27.00
No. 1 busheling	26.00-27.00
Machine shop turnings	6.00-7.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	29.00-30.00
No. 2 bundles	20.00-21.00
No. 1 busheling	31.00-32.00
Cast iron borings	10.00-11.00
Machine shop turnings	17.00-18.00
Shovel turnings	19.00-20.00
Bar crops and plate	38.00-39.00
Structurals & plate	38.00-39.00
Electric furnace bundles	32.00-33.00
Electric furnace:	
3 ft and under	35.00-36.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Stove plate	47.00-48.00
Unstripped motor blocks	35.00-36.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	39.00-40.00
Angles, splice bars	39.00-40.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	29.00
No. 2 heavy melting	27.00
No. 1 bundles	31.00
No. 2 bundles	*20.00*
No. 1 busheling	*31.00*
Machine shop turnings	7.50
Shovel turnings	9.50

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	36.00
Heavy breakable cast	34.00
Unstripped motor blocks	*35.00*
Clean auto cast	44.00
Stove plate	37.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00
Rails, random lengths	37.00
Rails, rerolling	51.00
Rails, 18 in. and under	*41.00*
Angles, splice bars	*38.00*

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	20.00-21.00†
Machine shop turnings	nom.
Low phos. plate & structurals:	
3 ft	37.00
2 ft and under	40.00-41.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	31.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

LOS ANGELES

No. 1 heavy melting	36.00
No. 2 heavy melting	29.00†
No. 1 bundles	33.00
No. 2 bundles	22.00
Machine shop turnings	13.00-17.00†
Shovel turnings	15.00-17.00†
Cast iron borings	15.00-17.00†
Cut structurals and plate 1 ft and under	44.00†

Cast Iron Grades

No. 1 cupola	39.00-44.00†

Railroad Scrap

No. 1 R.R. heavy melt.	39.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00-39.00
No. 2 heavy melting	33.00-36.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	33.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	38.50
No. 2 (prepared for shears)	30.00
No. 1 hvy (unprepared)	35.00
No. 2 heavy melting	35.50
No. 2 hvy (unprepared)	33.00
No. 1 (prepared for shears)	33.00
No. 2 bundles	23.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	36.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.50
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.50
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

†Nominal.

‡F.o.b. Hamilton, Ont.

fell to 76.5 per cent during the summer months.

Steelmen are happy with the year's production record, especially since it betters that in 1959 when there was an unusually strong demand from the U. S. due to the steel strike.

In March this year, Canadian steel hit an all-time monthly high, the mills operating at 102.7 per cent of rated capacity.

Despite the slower production pace recently, the Canadian industry is expansion minded. Its four large producers—Steel Co. of Canada Ltd., Algoma Steel Corp. Ltd., Dominion Steel & Coal Corp. Ltd., and Dominion Foundries & Steel Ltd.—all have multimillion dollar projects underway or planned.

Algoma recently decided to go ahead with a $30 million strip mill. Stelco is pushing a major iron ore development in Labrador.

While bothered by imports, the Canadian industry is demonstrating its ability to compete in the foreign market. Dominion Steel & Coal recently booked a big rail order from Mexico, and is bidding on a still larger one.

Steel Bars . . .

Bar Prices, Page 104

There are no signs of a marked pickup in hot rolled carbon and alloy bars. Metalworking shops are keeping a tight reign on inventories; fabricators are betting on prompt shipments in event there's a sudden surge in business. Mill deliveries run two to four weeks, depending on rolling cycles.

September bookings were about even with August's, with order volume sufficient to support 60 per cent production. Most new business is coming from automotive consumers. Demand from manufacturers of roadbuilding machinery, cranes, shovels, and tractors is poor, while the service centers, holding adequate stocks, are buying only fill-in tonnage.

A Pittsburgh area producer predicts his firm will be operating at 70 to 75 per cent of capacity by the end of this month, though his order book yet doesn't indicate that any early spurt in activity is likely.

The outlook for cold finished bar demand continues gloomy. Operations of some plants are down to 55 per cent of capacity—one turn, four days a week. Poor shipments in August and September reflected the small volume of orders placed in April, May, and June.

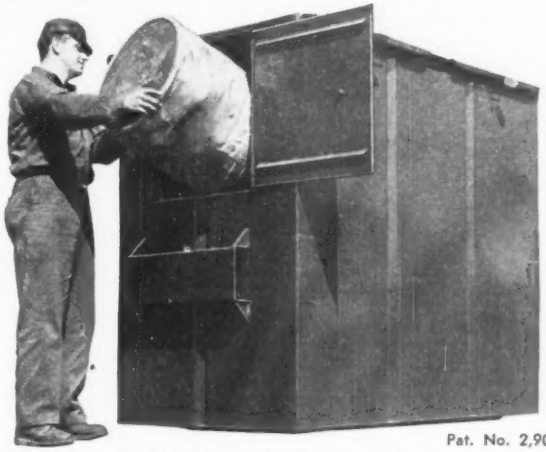
A new steelmaker, Border Steel Rolling Mills Inc., El Paso, Tex., last week announced the start of construction on a bar and rod mill at Vinton, Tex., with annual capacity of 50,000 tons. It is slated for completion in October, 1961. Initial installations will be a 12 ft diameter Lectromelt electric furnace, and an eight stand, semicontinuous Bliss mill. Edward J. Winter is vice president and general manager, with offices at 324 Mart Bldg., El Paso, Tex.

Circuit Breaker Prices Cut

Westinghouse Electric Corp. reduced catalog prices 8 to 39 per cent on floor mounted, oil filled, power circuit breakers; 20 to 50 per cent on frame mounted breakers; 26 to 47 per cent on single tank,

(*Please turn to Page* 121)

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...



Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

Dept. S-10 DEMPSTER BROTHERS Knoxville 17, Tenn.

DEMPSTER-DUMPMASTER

DEMPSTER-DUMPSTER

DEMPSTER DUMPMASTER EQUIPPED PRIVATE HAULERS

Defense Boosts Titanium Output

Nonferrous Metal Prices, Pages 120 & 121

TITANIUM mill product shipments this year should beat 1959's by at least 10 per cent. Shipments will be around 7 million lb compared with 6.4 million lb last year.

Through July, shipments totaled 4,812,332 lb. That's 600,000 lb, or about 14 per cent better than the pace in the year ago period.

Industry people estimate August sales took their customary dip as major consumers closed for vacations. Early indications are September might have been about on a par with July.

• **More Defense Work**—Titanium's better showing this year can be credited to more defense business. It means a little more of the metal went into jet engine construction, pressure vessels for liquid fuel missiles, and development work on missile cases.

The industry still suffers from the ups and downs of the defense market. Manned aircraft production, long the bulwark of titanium, is on the downgrade. The metal's use in missiles has been disappointing. And a big poundage civilian market is still more one of promise than of actuality. But such civilian markets as the chemical processing industry hold the key to the future of the metal, believe industry people. They are banking on recent and upcoming technological developments to establish titanium in metalworking and make the industry less dependent on the military market.

• **Profits a Problem**—It's unlikely that you will see many slashes in the titanium price in the near future. There's hardly any profit in the metal now.

Aluminum Output Slides

Primary aluminum production in the U. S. should still set a record this year, but the total will be less than originally forecast. Probable output: Slightly more than 2 million tons.

Output dropped off to 172,973 tons in August and will fall more in September as production cutbacks begin to be felt. More than 70,000 tons of production capacity has been shut down since midsummer.

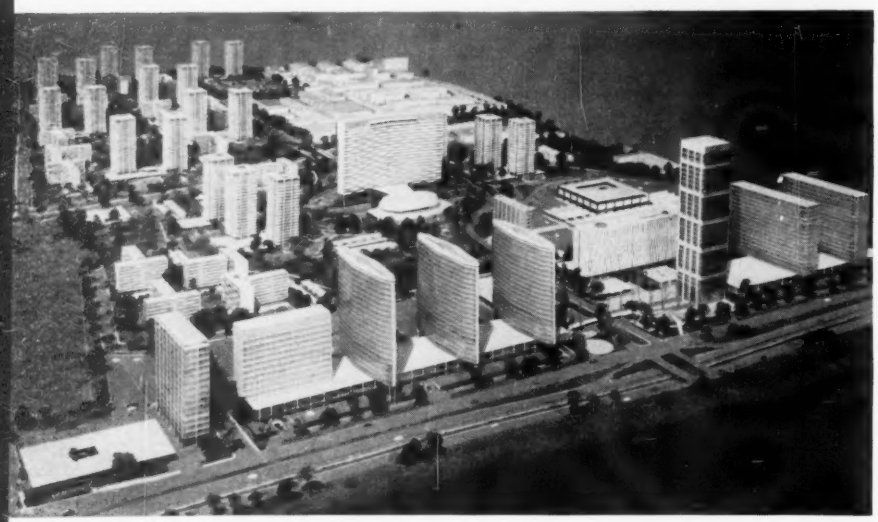
In Canada, Aluminium Ltd. last week announced a cutback of 17,000 tons.

The situation has been reflected in pricing practices, particularly for semifabricated shapes, which one aluminum executive describes as "frightful and chaotic."

Market Memos

August brass and bronze ingot shipments hit 20,216 tons for their best month since April. Through the first eight months, shipments stand at 164,082 tons compared with 186,992 tons in the same period last year.

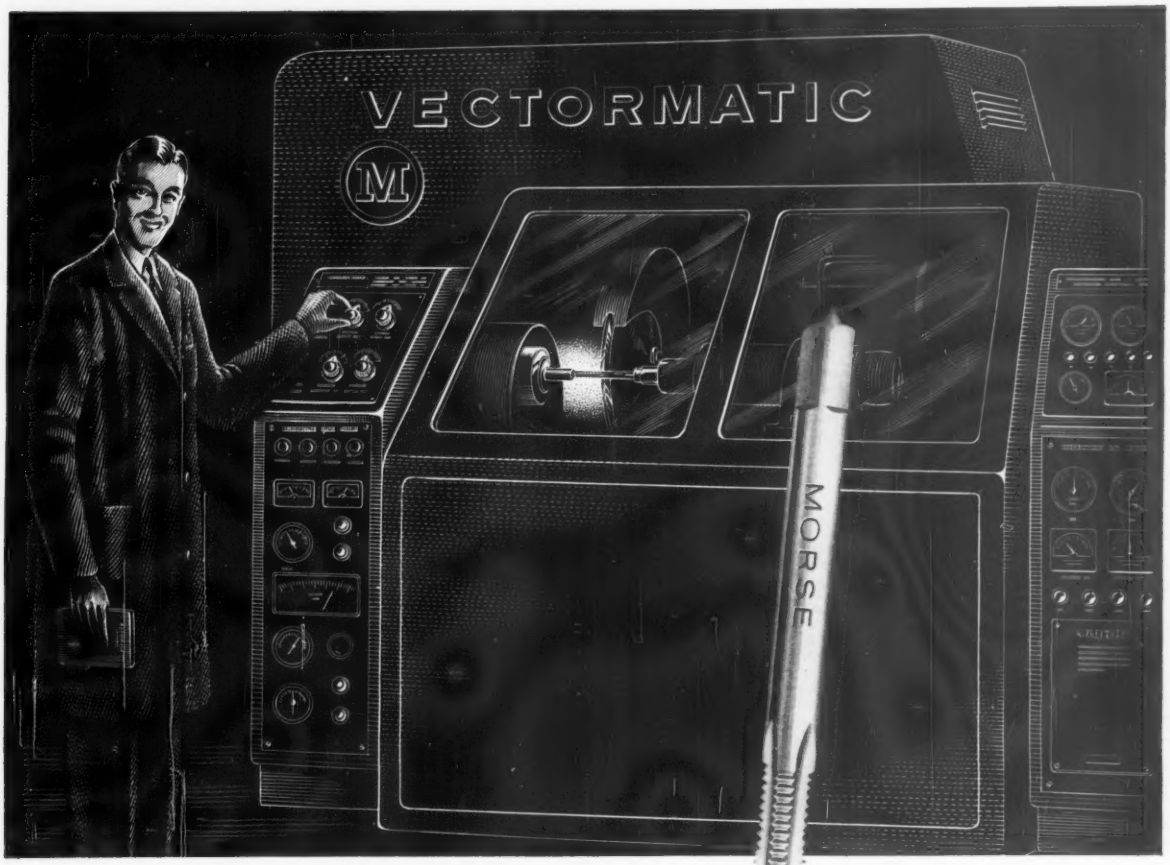
• **Growing Market** — Consumption of superpurity aluminum, which hit a record 6.4 million lb last year, will more than double in the next five years, predicts the Business & Defense Services Administration. Projection for 1965: At least 15 million lb. The 99.99 per cent metal is finding increased uses in electronics, chemical processing, electrical products, jewelry, petroleum refining, and optical frames.



Building a Market

The big push in aluminum for architectural applications is typified by the soon-to-be-built apartment community in Los Angeles. A joint effort of Webb & Knapp Inc. and Aluminum Co. of America, "Century City" (left) will go up on a tract formerly owned by Twentieth Century-Fox Film Corp. It'll house 30,000 people, cost $250 million, and use lots of aluminum. In Cincinnati, Reynolds Metals Co. is putting up 24, all aluminum, eight family units and one, 131 unit apartment house. Rumor has it that Webb & Knapp and Alcoa will soon team up again to build a luxury apartment project in Pittsburgh.

MORSE AGAIN BRINGS YOU THE BIGGEST NEWS IN CUTTING TOOL HISTORY



First Patent of Its Kind Ever Issued For Tap-Manufacture

"Vectormatic" **grinding** – the revolutionary new principle of tap manufacturing is now an *exclusive Morse patented process.*

"Vectormatic" *automatically* and accurately controls grinding wheel feed limit and compensates for changes in the position of the cutting face of the wheel due to wheel dressing.

"Vectormatic" **taps** are *absolutely uniform,* with keen cutting edges that insure longer service life than any other tap on the market. For fast, economical, exact tolerance tapping, order "Vectormatic." Call your Morse Franchised Distributor today . . . your *only* source for patented Morse "Vectormatic" taps.

Patent No. 2929172 granted March 22, 1960. 2676

MORSE

means "THE MOST" in Cutting Tools

MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASSACHUSETTS

Warehouses in: NEW YORK • CHICAGO • DETROIT • DALLAS • SAN FRANCISCO

VN A Division of VAN NORMAN INDUSTRIES, INC.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.50-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 102.25.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00. East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.25-28.00; No. 12 foundry alloy (No. 2 grade), 23.75-24.25; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 26.75-27.75; 108 alloy, 24.25-24.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	51.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire 23.00-23.50; No. 2 heavy copper and wire, 21.00-21.50; light copper, 19.00-19.50; No. 1 composition red brass, 18.00-18.50; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	57.13b	54.86c	....	58.32
Yellow Brass	50.57	36.06d	50.86	54.23
Low Brass, 80%	53.53	53.22	53.82	57.09
Red Brass, 85%	54.58	54.27	54.87	58.14
Com. Bronze, 90%	56.17	55.86	56.46	59.48
Manganese Bronze	58.86	52.21	62.69	....
Muntz Metal	53.20	48.26	....	....
Naval Brass	55.12	48.68	61.43	58.78
Silicon Bronze	62.86	61.80	62.15	80.79
Nickel Silver, 10%	65.98	68.06	68.06	....
Phos. Bronze	77.44	78.19	77.69	79.37

SCRAP ALLOWANCES e (Based on copper at 33.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	29.000	29.000	28.250
Yellow Brass	22.250	21.250	20.250
Low Brass, 80%	24.750	24.500	24.000
Red Brass, 85%	25.750	25.500	25.000
Com. Bronze, 90%	26.750	26.500	26.000
Manganese Bronze	20.750	20.500	20.000
Muntz Metal	20.875	20.625	20.125
Naval Brass	20.750	20.500	20.000
Silicon Bronze	28.375	28.125	27.375
Nickel Silver, 10%	26.875	26.625	13.437
Phos. Bronze	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 16.50-17.00; new brass clippings, 15.00; light brass, 11.00-12.00; heavy yellow brass, 12.00-13.00; new brass rod ends, 13.00-13.50; auto radiators, unsweated, 13.00-13.25; cocks and faucets, 13.25-13.75; brass pipe, 14.00-14.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 5.25-5.50; segregated low copper clips, 12.00-13.00; segregated high copper clips, 11.50-12.00; mixed low copper clips, 12.00-12.50; mixed high copper clips, 11.00-11.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 8.00-8.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 13.50-14.00; mixed low copper clips, 14.00-14.25; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 26.50; No. 2 heavy copper and wire, 24.50; light copper, 22.25; refinery brass (60% copper) dry copper content, 22.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.50; No. 2 heavy copper and wire, 24.50; light copper, 22.25; No. 1 composition borings, 21.25; No. 1 composition solids, 21.75; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 17.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.
Copper: Flat-rolled, 50.04; oval, 46.50, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.

Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.

Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 110.20; 100-1900 lb, 108.20; 2000 lb or more, 106.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 117)
distribution breakers. Indoor oil breakers were not affected. Also, prices are being published for the first time covering ratings of the new SF_6 gas breakers. These are higher than the newly published oil breaker prices.

Structural Shapes . . .

Structural Shape Prices, Page 104

Structural fabricators' steel stocks are low, but they're still buying hand to mouth, with mill shipments easy at two to four weeks on standard and wide flange sections. With orders spotty, fabricating shops continue to cut into backlogs, which, for some, are now measured in weeks.

Missile base construction is going to prequalified contractors. The Engineers Corps is also taking over where work seems to be lagging. Contracts approximating $300 million are involved, and it means deliveries of heavy fabricated steel will have to be stepped up in some cases.

New York State opens bids Oct. 21 on the largest bridge program (in point of structural steel tonnage) in many months.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7250 tons, bridge superstructure, Columbia River, Grant, Kittitas, and Vantage Counties, Wash., to American Bridge Div., U. S. Steel Corp., Pittsburgh.

7000 tons, state bridgework, FICHE 60-3, across Harlem River, New York, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

926 tons, state highway structures, Lowell, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; Campanella & Cardi Construction Co. Inc., Warwick, R. I., general contractor.

800 tons, manufacturing plant, Electric Autolite Co., Decatur, Ala., to Decatur Iron & Steel Co., Decatur; Daniel Construction Co., Birmingham, general contractor; reinforcing bars to Joseph H. Fox & Co., Birmingham.

710 tons, Bucks County courthouse, Doylestown, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, Shorecraft School, Seattle, to United Iron Works, Seattle; Wick Construction Co., Seattle, general contractor.

295 tons, two state highway bridges, relocation Route 28, Falmouth, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; Campanella & Cardi Construction Co. Inc., Warwick, R. I., general contractor.

250 tons, conveyor facilities, Marquette Iron Mining Co., Republic, Mich., through M. W. Kellog Co., to Belmont Iron Works, Eddystone, Pa.

240 tons, two grade separations, near Moline, Ill., to Wendnagel & Co. Inc., Chicago.

170 tons, factory, Quaker Maid Kitchens, Reading, Pa., to Belmont Iron Works, Eddystone, Pa.

150 tons, repairs to Magnolia Bridge, Seattle, to Reed Boiler Works, Bellingham, Wash.; Willar Construction Co., Seattle, general contractor.

149 tons, including 34 tons of reinforcing bars, three span I-beam bridge, Orlando-Bucksport, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Forest Frederick, Pittsfield, Maine, general contractor.

100 tons, refinery facilities, Standard Oil Co. of New Jersey, Bayonne, N. J., to Belmont Iron Works, Eddystone, Pa.

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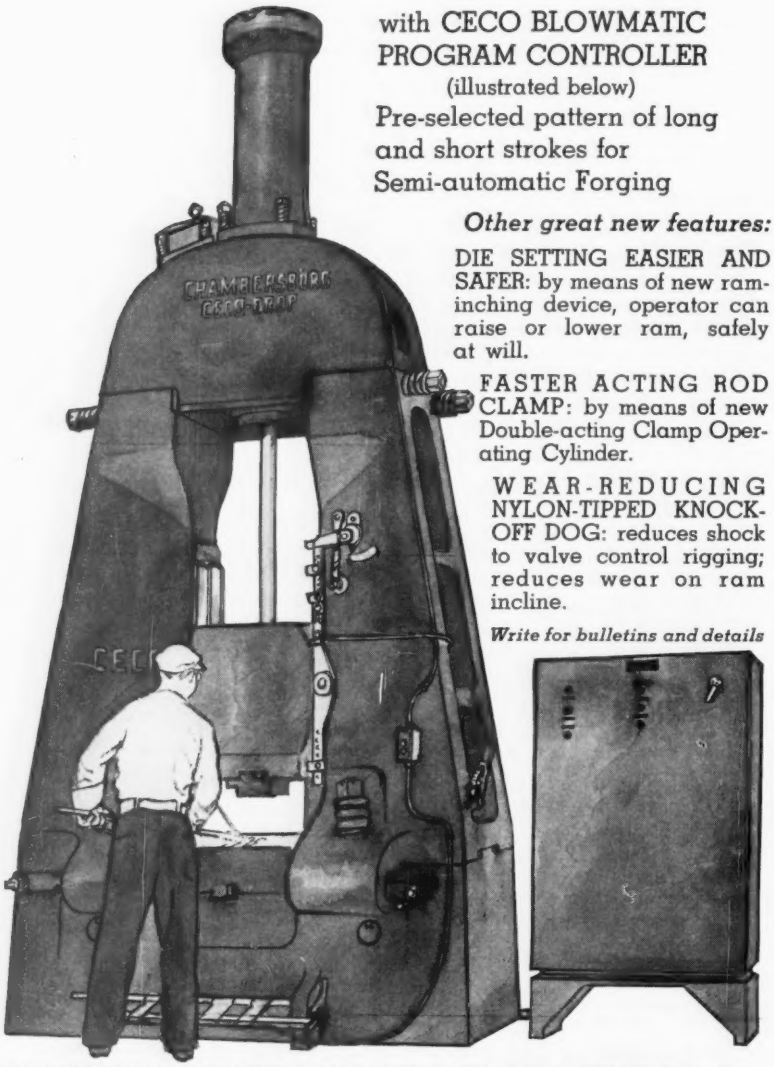

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100 tons, fish facility equipment, Mayfield Dam, Tacoma, Wash., to Star Iron & Steel Co., Tacoma, at $26,167.

STRUCTURAL STEEL PENDING

2000 tons, Weaver Building, 104 W. 40th St., New York, MacArthur Construction Co., New York, general contractor.

750 tons, building, Industrial Fine Arts, Buffalo, Rouse Construction Co., Buffalo, low on the general contract.

750 tons, state bridgework, TISH 60-8, Saratoga County, N. Y.; Kiewit, Syracuse, N. Y., low on the general contract.

350 tons, science building, Oswego, N. Y., Rouse Construction Co., Buffalo, low on the general contract.

287 tons, state bridgework, Allegheny County, Pennsylvania, bids Oct. 14; also, 360 tons of reinforcing bars required.

200 tons, building, General Electric Co., at Emporium, Pa.; John Eisele, New York, low on the general contract.

130 tons, seven transmission towers; bids to Chugach Electric Association, Anchorage, Alaska, Oct. 24.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2075 tons, Wheeler Dam, Alabama, Tennessee Valley Authority, Knoxville, Tenn., to Laclede Steel Co., St. Louis; direct bids.

687 tons, state highway structures, Lowell, Mass., to Northern Steel Inc., Boston; Campanella & Cardi Construction Co. Inc., Warwick, R. I., general contractor.

290 tons, Seattle University science building, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Wick Construction Co., Seattle, general contractor.

212 tons, repairs to Hood Canal floating bridge, Washington State, reported to Joseph T. Ryerson & Son Inc., Seattle; Yuba Consolidated Industries Inc., Emeryville, Calif., general contractor.

192 tons, two state highway bridges, relocation Route 28, Falmouth, Mass., to Northern Steel Inc., Boston; Campanella & Cardi Construction Co. Inc., Warwick, R. I., general contractor.

REINFORCING BARS PENDING

360 tons, state bridgework, Allegheny County, Pennsylvania, bids Oct. 14; also, 287 tons of structurals required.

235 tons, also 50 tons of shapes, booster pump plant and reservoir, Chief Joseph Dam project; bids to Bureau of Reclamation, East Wenatchee, Wash., Oct. 27.

100 tons, footings for power transmission line; bids to Chugach Electric Association, Anchorage, Alaska, Oct. 24.

75 tons, Washington State underpass, Whatcom County; bids to Olympia, Wash., Oct. 4.

Unstated, women's residence and dining facilities, Carroll College, Helena, Mont.; general contract to Waddell Construction Co., Helena, Mont., low at $800,000.

PLATES . . .

PLATES PLACED

123 tons, 1001 plates, Raritan Arsenal, Metuchen, N. J.; bids Oct. 5; additional 970 plates set aside for labor surplus areas.

Unstated, piling and bulkhead materials, Shilshole Bay, Seattle; bids to Port of Seattle, Oct. 4.

Unstated, four storage tanks, total capacity 200,000 barrels, tank farm project; plans approved by Port of Vancouver, Wash.; bids soon.

Unstated, 40 ft diameter welded steel reservoir, roofed; also piping, etc.; bids to Spokane, Wash., Oct. 13.

PIPE . . .

STEEL PIPE PLACED

130 tons, fabricated steel pipe, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

RAILS, CARS . . .

RAILROAD CARS PLACED

Northern Pacific, 500 boxcars, to its own shops at Brainerd, Minn.

Advertising Index

Aetna-Standard Division, Blaw-Knox Co. ..... Inside Back Cover
Ajax Magnethermic Corporation 14, 15
Allen-Bradley Co. 54
American Messer Corporation 61
American Society for Metals 62
American Steel & Wire Division, United States Steel Corporation 2, 3
Arcos Corporation 94, 95
Armstrong-Blum Mfg. Co. 33
Automotive Gear Division, Eaton Manufacturing Co. ..... Inside Front Cover

Bethlehem Steel Co. 1
Birdsboro Corporation 68
Blaw-Knox Co., Aetna-Standard Division ..... Inside Back Cover
Branson Instruments, Inc. 60

Carpenter Steel Co., The 48
Chambersburg Engineering Co. 122
Cleveland Worm & Gear Division, Eaton Manufacturing Co. 38
Colorado Fuel & Iron Corporation, The ..36, 37
Columbia-Geneva Steel Division, United States Steel Corporation 2, 3, 17, 18, 19
Cone-Drive Gears Division, Michigan Tool Co. 100

Dempster Brothers 117
Dyson, Joseph, & Sons, Inc. 100

Eaton Manufacturing Co., Automotive Gear Division ..... Inside Front Cover
Eaton Manufacturing Co., Cleveland Worm & Gear Division 38
Electric Equipment Co. 121

Fairfield Manufacturing Co., Inc. 84
Fuji Iron & Steel Co., Ltd. 124

General Electric Co., Large Lamp Department 23
Gisholt Machine Co. 13

Hill Acme Co., The, Hill Division 47
Hitchiner Manufacturing Co., Inc. 6
Homestead Valve Manufacturing Co. 11

International Nickel Co., Inc., The 34

Jessop Steel Co. 107
Jones & Laughlin Steel Corporation 24, 25

Kardong Brothers, Inc. 114
Kentucky, Commonwealth of, Department of Economic Development 53
Keystone Lamp Manufacturing Corporation .. 121

Lucas Machine Division, The New Britain Machine Co. 21, 22
Lukens Steel Co. 58

McGill Manufacturing Co., Inc., Bearing Division 108
McKee, Arthur G., & Co. 121

Malleable Castings Council 88, 89
Mesta Machine Co. 79
Michigan Tool Co., Cone-Drive Gears Division 100
Miller Electric Manufacturing Co., Inc. 99
Morse Twist Drill & Machine Co., A Division of Van Norman Industries, Inc. 119

National Machinery Co. 16
National Metal Congress & Exposition 62
New Britain Machine Co., The, Lucas Machine Division 21, 22

Ohio Crankshaft Co., The 90
Oilgear Co., The 7

Peninsular Steel Co. 114

Republic Steel Corporation 8, 9
Ryerson, Joseph T., & Son, Inc. 28

Silent Hoist & Crane Co. 10
Simonds Abrasive Co., Division of Simonds Saw & Steel Co. 4
Snyder Corporation 57

Taft-Peirce Manufacturing Co. 77
Tennessee Coal & Iron Division, United States Steel Corporation 2, 3, 17, 18, 19
Timken Roller Bearing Co., The .... Back Cover
Torrington Co., The, Special Metal Parts 101

Unitcast Corporation, Steel Foundry Division .. 92
United Engineering & Foundry Co. 27
United States Steel Corporation, Subsidiaries 2, 3, 17, 18, 19
United States Steel Export Co. ..2, 3, 17, 18, 19
United States Steel Supply Division, United States Steel Corporation 17

Van Norman Industries, Inc., Morse Twist Drill & Machine Co. Division 119
Victor Saw Works, Inc. 93

Weinstein Co. 121
Westinghouse Electric Corporation 12
Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corporation 36, 37

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Table of Contents

Facing Inside Front Cover

Classified Advertising, Page 121

TO FIND THE MAN YOU NEED...

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking.

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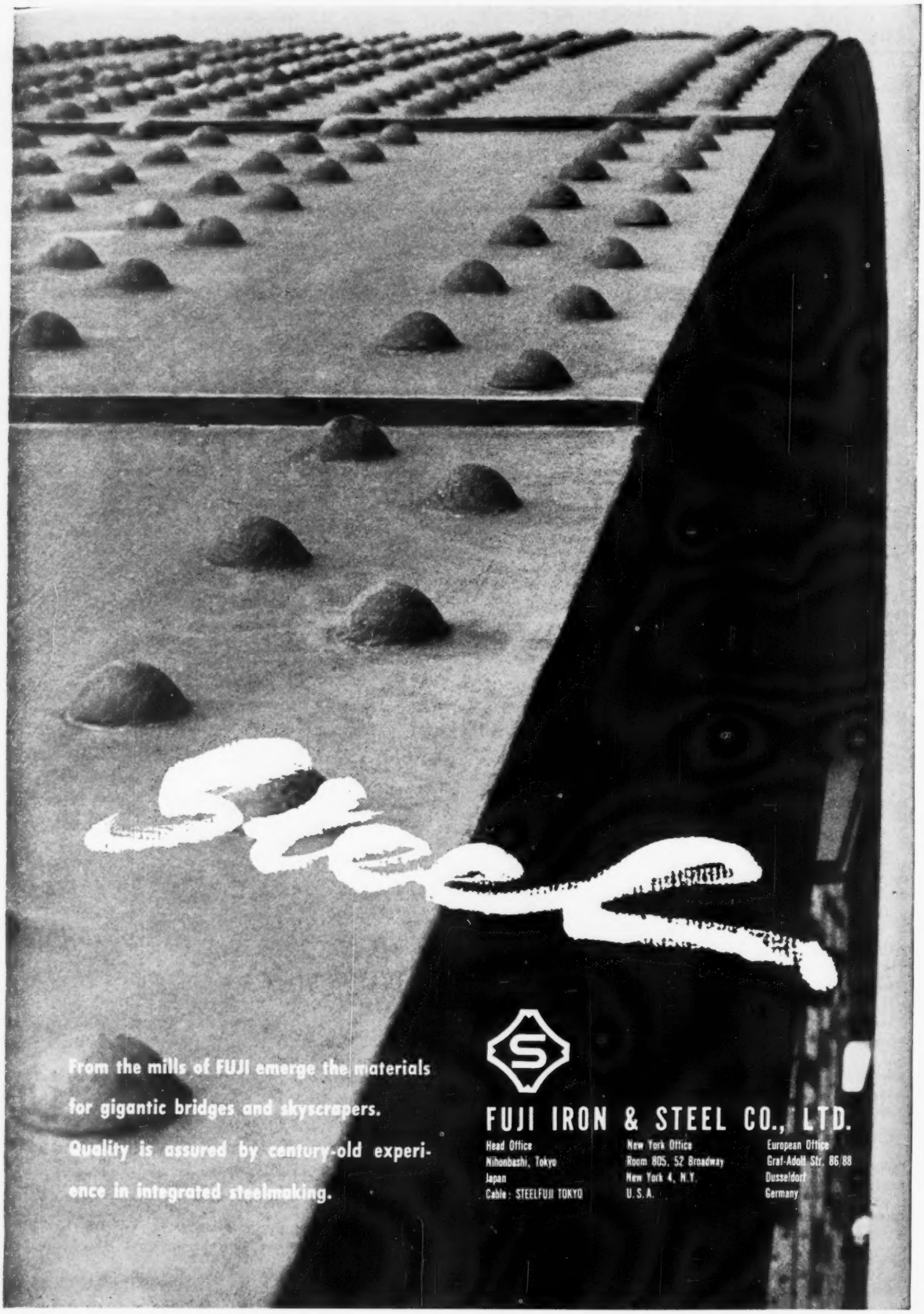

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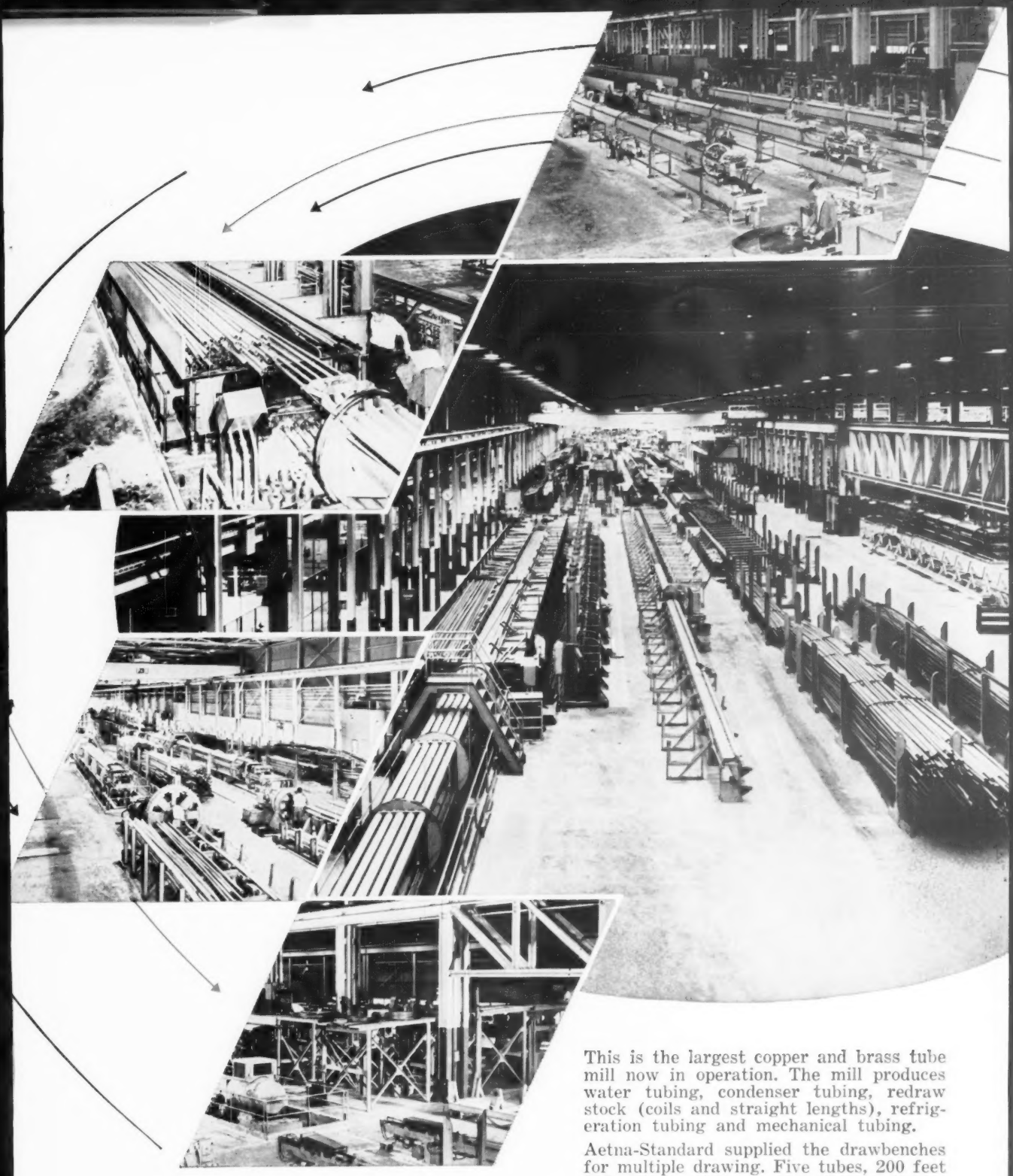

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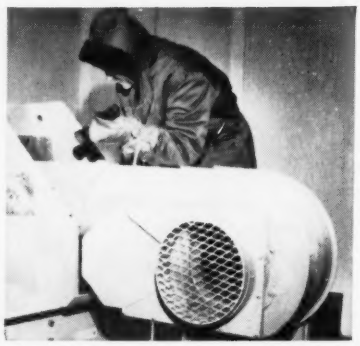
ENGINEERING SERVICE ON-THE-SPOT from our graduate engineer salesmen helps you solve bearing problems right at the design stage. You save time and money.



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